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IN ALL THEIR DEPARTMENTS.

BY A COMMITTEE OF PRACTICAL SURVEYORS, ENGINEERS, AND ARCHITECTS, OF MUCH EXPERIENCE AND IN ACTIVE EMPLOYMENT.

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QUAY AND RAILROAD ALONG THE NORTH BANK OF THE THAMES.

SIR FREDERICK TRENCH, who broached this project in the year 1826, has very recently put forth a pamphlet on the same subject, in the shape of a letter, addressed to Lord Duncannon; and we know not whether most to admire the phraseology of the pamphlet, or the whimsical and un-engineer-like character of the project itself. The most curious part of the pamphlet is its *terminus*, especially taken in contrast with the following passages on pages 4 and 5.

"The Emperor of Russia lamented that the finest river in Europe should be condemned to be a *Cloaca Maxima*, and complained that, after a fortnight's residence in London, he had not obtained a sight of the Thames of which he had heard so much.

"The plan I now propose will bring its grandeur and beauty into daily and hourly observation, and no one will deny that a railroad running (!) from London bridge to Hungerford market (which may be passed over in four minutes), will be a great accommodation to the public, and I think it will be admitted that such a colonnade as I now propose to you, affording a walk of one mile and three quarters in length, and sheltered from sun and rain, will be a feature of utility and magnificence not to be equalled in any capital in Europe. Your Lordship has already expressed your conviction of the great importance of the plan I submitted to your consideration when it first occurred to me—and if I can prove that it will not only pay its own expenses, but the expense of erecting the whole of the embankment suggested by Mr. Walker, as well as the railroad, and promenade, and carriage-road which I now propose, and leave a very large surplus for its embellishment and for other objects of improvement; I am confident that such a plan will receive all the assistance and protection which your official situation enables you to give it!

"It is but justice to admit the judicious and effective manner in which you have administered the important department entrusted to your care. I have seen with pleasure your arrangements in Hyde Park and the Green Park. I find you endeavouring to establish a place of healthful recreation for the inhabitants of the eastern part of this crowded city; and I acquit you of the guilt of all the petitesse and cockney prettyness which have disgraced the stately avenues of St. James's Park with little lakes, and little islands, and little clumps of pretty little shrubs! very fit improvements for the twenty or thirty acres of a wealthy shopkeeper in the vicinity of London, but utterly unsuited to the character of a great park in the centre of a great city."

In this Sir Frederick gives his Lordship abundant praise, and expresses a hope that the official influence of Lord Duncannon will be exerted, in carrying into effect this project, which is so much praised and admired by its projector. When, however, we turn to the *terminus*, we find that the whole pamphlet, like the emblematical serpent of antiquity, shuts its mouth with its own tail, and Sir Frederick politely bows, or takes his part in bowing, Lord Duncannon out of the office, with much thanksgiving and exultation upon the occasion. But read his own words:

"It would be gross hypocrisy in me to express regret at your leaving the office which I admit you have administered so well; or to deny the delight with which I anticipate the downfall of that whig-radical administration of which you are a member: but, in taking my leave of your Lordship, the greatest compliment I can pay you is to express my earnest hope that the conservative who is destined to succeed you, may possess as much candour, and good sense, and good taste; and be as well disposed as you are to adopt a plan at once so useful, so profitable, and so magnificent."

We have nothing to do with the politics of either of the parties; but we give this specimen of Sir Frederick Trench's powers as a writer, before we come to examine his project in mud and mortar, brick, stone, and cast iron, with a wooden railroad, fixed engines, locomotive carriages, and many *et ceteras* to boot,—among which may be enumerated under-wharfs or docks, lighted by gratings in the promenade; and the railroad mounted on columns over the footway for passengers; but it is time to say something of the project itself, in its extent, its cost, its possibility, and in the figure that it would cut if it were practicable. It is proposed to form an embankment of the river, in great part resembling one proposed by Mr. Walker; and to place on the top of this, the railway, of which we believe Mr. Walker's plan said nothing. It is proposed to extend these structures from Hungerford Market to London Bridge, which is a distance of about a mile and three quarters. Before we proceed to examine the work itself, we must consider the propriety of the terminations. Now, with great deference to Colonel Trench and the other parties whom he mentions as being favourable to his plan, we must mention, and refer to any one who chooses to inspect the river, that these are about the most inconvenient approaches that could have been selected. At Hungerford market there is no carriage-way from the Strand to the river which is even tolerable, unless made at enormous expense, and the sacrifice of much property, while, after all, the termination of the railway would be a perfect nuisance, from the steam boats that throng there, and the numerous coal barges in the close vicinity. The place would not do except for a very hurried and generally speaking humble class of pedestrians, and this would strike a heavy blow at the supposed vast revenue arising from omnibus travelling. London Bridge again, if not worse than Hungerford market, is certainly as bad to proceed from: it would lead the greater part of passengers both to and from the city out of the way, because it lies beyond the Bank of England, the Exchange, and all the chief places of resort at the East End. It is true that cabs and coaches to all parts of the city can be hired at London bridge; but this would be an additional expense, and would occasion trouble and delay. Thus, though the city end of London bridge might be made a more decent

termination to the line of way than Hungerford market, it would be just as inconvenient, and neither of them, nor the road itself, would be adapted for that kind of traffic which is the most necessary, and would on that account be the most profitable.

From the terminations we proceed to the work itself. This, as has been said, is proposed to consist of an embankment a mile and three quarters long, with a railway raised upon cast-iron pillars along the top of it. How far the river wall of this embankment may extend beyond the present line of the wharfs, &c., we do not exactly know; but, an additional piece which is proposed to extend westward to beyond Montague House, is to have 195 feet for additional garden to that house, besides the railway and screen riverward of this. From the sketches given, it does not appear that there is to be any footway here, as the railway carriages are represented as being on the top of a terrace, and are screened from the gardens, or rather the gardens from the view of them, by a higher terrace, and a projecting shelf supported upon brackets. Why there should be this change of plan in the extension westward, with no promenade along with the railway, does not appear, but the probability is that it is done to please the influential proprietors from Northumberland House to Montague House, inclusively, and this is saying, in other words, that the line of communication is not for them, but for a humbler description of passengers, the great majority of whom would still have passage only between Hungerford and London bridge, none of which places are at all adapted for carriages.

Leaving out this supplemental part, which Colonel Trench proposes to extend as far as Westminster bridge, and, of course, make it conterminous, or nearly so, with the terrace of the new houses of parliament, the rest has the very singular character to which we have alluded. It is not very easy to obtain a comprehendible notion of this queer structure, even with the assistance of the projector's sketches; but we must endeavour to do the best we can without them. The riverward part of the embankment, which is the only one excepting the railway, of which much mention is made, is to consist of a river-wall, faced with masonry, and covered with plates of cast-iron, painted in imitation of stone. Where the different wharfs are situated, this is to be divided into arches, of which the span, as exhibited in the sketch, is about 25 feet. The openings of those arches are to admit barges into the docks, which will thus be formed, covered over, and lighted from the roof, if we understand the plan rightly. The entrances of these arches will have a row of dwarf piles extending from pier to pier, and so low that the barges can pass over them. Thus they will serve, not, as is supposed, as barriers to shut out the silt of the river, but as traps to receive the silt, and retain it under cover as though it were a valuable commodity. Of them, however, we shall speak more at length hereafter. The tops of these dwarf piles are to be about 12 feet below Trinity high water mark, 3 feet below half tide, and about 4 feet above low water mark. If the arches were to be constructed according to the sketch, no barge could enter or pass out at high water of spring tides, as that reaches within 3 feet of the crowns of the arches. In like manner, no barge drawing more than 3 feet water could pass over the dwarf piles at or under half tide; and there would be a fall of 4 feet over the piles at low water.

The number of arches that would be required is not specified, but they would of course be required at all the principal wharfs, which are pretty numerous, but not at equal distances. The spaces between the wharf-arches are proposed to be continuous quays, consisting of a plain rusticated wall, faced with cast-iron, as above stated; but not broken by any imitation openings, though blind arches are shown in the sketch. The embankment is proposed to be four feet above Trinity high-water mark.

Before, however, we proceed farther with the embankment, it will be necessary to advert to the platform for the railway. This is proposed to be 30 feet wide, and 13½ feet high. It is to be supported on columns, which on the average are marked about 10 feet apart, and as they are to be placed in pairs, double the number would be required for one row in length, that is, about 1848 columns for the whole length of the bridge. According to the cross section,—of which, however, nothing is said in the letter-press,—there will be four rows of these columns extending the whole length, that is, a row at each side, and one between each of the two sets of rails. This will make the whole number of columns about 7392; and as considerable strength would be required, they would need to be very heavy, and consequently very costly. The platform which those columns support, does not show any entablature in the sketch, either of the elevation or the section; and if constructed thus, the thing would have an air of extreme feebleness, and be quite an architectural abortion—or rather, a sort of "sooterkin," like nothing rational upon earth.

One of the parts of the whole fabric, at which it would be not merely offensive but painful to look, would be, the columns standing on the crown of an arch, which are four in number in the sketch, and would have to be increased if the spans of the arches were extended, and the entrance to the wharfs made more commodious. The arches shown in the sketch are so flat, and the band over them—for it is only a band, is so meagre, that we believe the eight columns, or rather, the sixteen columns of the four rows that would have to stand on it, would break it down, in reality, independent of the weight of the superincumbent railway; and, at all events, this would be the appearance, and one at which it would be painful to look. To rest a single column upon an arch is an architectural solecism, even though there is no immediate danger of breaking down; but when there is actually such danger, or the fear of it is apparent, the sight of such an absurdity is exceedingly painful, nor do we see how it would be possible to get over it in such a structure as the one under notice.

The erection of this immense mass of cast-iron, upon the top of the quay or terrace, would greatly increase the expense of that part of the project, and take it quite out of the same class with the embankment and promenade proposed by Mr. Walker. For the purpose of a mere embankment, a single wall toward the river would have answered, had it been of sufficient strength of masonry, duly strengthened by counterforts inside, and not filled up too hastily with wet sludge and rubbish dredged from the bottom of the river. But the erection of the railway upon its 7392 cast-iron columns, arranged in four rows the whole length, would quite alter the state of things, and absolutely quadruple the extent of masonry by making it equal to a wall seven miles in length, and of substantial building throughout. In the first place, there must be two exterior walls, that is, one for the river-side, and one for the land-side; for if the former only were of masonry, and the latter of made up ground, the whole structure, carriages and all, would sink on the land side, and lean, and ultimately tumble in that direction. Even if this did not speedily happen, the carriages would, in consequence of the deviation from the level, be constantly running off the rails, and tumbling into the carriage-way, which it is proposed

to construct immediately within the colonnade. In the second place, the two inner rows of columns would have to be supported on masonry, as well as the external ones; and as the best way of doing this would be by cross walls at every ten feet, it would require double the masonry of each of the others; and the expense of this would be enormous. No other plan would, however, be sufficient, and so this would be unavoidable. Then again for the carriage-way: it would be a very bad one, and liable to constant pitting and giving way if there were not a wall of masonry along the landward of it; and though this were supplied, the roadway would be liable to sink and become a sort of quagmire, as it would scarcely be possible to avoid the infiltration of water; consequently, if there were much traffic, and especially traffic of heavy carriages, this road or street would be a very tender and expensive one. At the same time it would be very ugly; for its small height above high-water would give it very little view of the Thames, and none of the country beyond; and the colonnade would be too near for having any effect but that of communicating offensiveness, by the continual interruption of its columns, and the breadth and depth of its shadow. Its low level, and the exclusion of the air and action of the sun-beams, would also keep it continually dirty, and countless little whirlwinds would, in dry weather, keep the dust of it in continual motion under the colonnade, which would not afford the most agreeable of atmospheres to the promenaders. The intended breadth of this carriage-way we do not find mentioned; but as twenty feet would be a very insignificant one, we may take the whole breadth of the colonnade and carriage-way at fifty feet, which would greatly diminish the extent of made-up ground, the value of which is so loudly trumpeted as a means of remuneration.

The expense of all this underground and above-ground erection would be so great, that it would be enough to prevent the execution of the work, more especially where the access to both extremities is so awkward, and the chance of revenue so very problematical. As will be seen, the estimate stated by Colonel Trench, which we shall quote by and by, is £435,500; but this would not pay for the building and embanking, if done as they ought to be done; and as this is about one-fourth of the estimated cost of the whole, it is probable that the work would cost more than two millions sterling! and this, without what would be by far the heaviest part of the whole cost. As the sum total given by Colonel Trench coincides exactly with that sanctioned by Sir F. Smith and Mr. Bidden, we shall quote only the former:

"EXPENDITURE.

	£	s.	d.
For the embankment, 1 mile and ¾, calculated as if all were solid work	110,000	0	0
Elevated platform for rail-road, including everything	100,000	0	0
For the machinery	70,000	0	0
For station houses	25,000	0	0
	£305,000	0	0
Interest of £305,000 at 5 per cent. for two years, till the rail-road begins to pay	30,500	0	0
	£335,500	0	0
Add, for filling in between the new embankment and the old one; for carriage road, paving, lighting, and prolonging the sewers, &c. &c. &c.	100,000	0	0
Total	£435,500	0	0

WAYS AND MEANS.

	£	s.	d.
I suppose 4 carriages running each way, and carrying 14 each = 56, being a total of 112			
I take but 100 passengers at 6*d.* each, per trip		2	10 0
But each trip takes 4 minutes, 48 minutes give 12 trips, and allowing 12 minutes for getting in and out, I count 12 trips, per hour	£30	0	0
			12
And if the rail-road works 12 hours, it will give, per day	£360	0	0
And multiplied by 365 days			365
Will produce, per annum	£131,400	0	0
Deduct the annual expense of working	25,000	0	0
The balance is	£106,400	0	0
Which, taken at 20 years' purchase			20
Will represent a capital of	£2,128,000	0	0
From this deduct the expense	435,000	0	0
And the clear net surplus will be	£1,693,000	0	0
Or, if taken at 25 years' purchase, the surplus would be	£2,660,000	0	0
Deduct	435,000	0	0
Total	£2,225,000	0	0"

Of the ways and means, or return side of the estimate, we say nothing, as it is grounded on a mere assumption, and one which would not likely be realized. 100 passengers would not pass along every four minutes; the trains would not work at this rate for twelve hours each day; nor would they work for the whole 365 days of the year. Then the expense of working, with the indeterminate item of repairs, would cost more than double the sum stated, which would reduce the annual return to about £80,000, even on the Colonel's own showing. This, again, instead of 25 years' purchase, could not be taken at more than 15 or 20, notwithstanding that "Mr. Higgins, a surveyor of long standing and great experience in these matters, says 'a ground rent well secured has sold for 30 or 31 years' purchase, and I take 25 years' purchase as a fair medium.'" This, it will be observed, is not a ground rent, but a structure which can be compared with nothing existent; but take it at 20 years, and it does not amount to very much more than half of what is stated by Colonel Trench, from the very same assumed and guess-work data. It is true that, in each of the estimates of ways and means, the value of the made-up ground which Colonel Trench rates so highly is left out; but we suspect it will be found that there is left out, in the expenditure, a sum which would balance this many times over. Not one word is mooted respecting the purchase of the present wharfs, or of the right of constructing new ones in places where there are now none, and as little is there even a hint about the injury done to trade throughout the whole mile and three quarters, and the total ruin of it in many places; nor is there any allowance for the parliamentary expenses, including those that must arise from the formidable opposition that would be made to such a project. Now all these taken together, though no exact estimate can be made, would cost many millions, and the sale of

the made-up ground, whatever might be the extent of it, would bring comparatively little.

No man can at present estimate what would be the effects upon the river; but some sort of guess may be formed by examining that part of the wide estuary, where the north and south tides and the discharge of the Thames contend with each other. The immediate effect of their contest is to fill the estuary full of eddies; and from the quantity of debris and rubbish which is there, and kept stirring by the eddies, the banks are numerous, and in many places shifting. The Thames at London is less in comparison with the expanse of the estuary water, than a pennant is in comparison with a mainsail; and as its eddies would be multiplied and varied by the projected erection, and there is no lack of mud withal, the chance, nay the certainty, is, that the said banks would be more numerous and shifting than ever. Colonel Trench thinks that if the present banks and shoals were cleared away by systematic dredging, the change produced by this project would prevent them from returning; but the Colonel bepraises his project in so extraordinary a manner, that what he says of it must be received *cum grano salis*.

We are inclined to think that it would injure the whole navigation, and render the wharfs the most intolerable of nuisances. When the tide was rising, a current would set in through each arch; and when the tide was falling, a current would set out. These currents would be taken by the general set of the water, and this would be greatly increased by the splash of steam boats, so that the mud would keep continually stirring in some places, and be dropped in others, and the banks formed there would be apt to shift with the varying states of the water, so that those plying along would not be certain of the same depth of water at the same place, even for a few consecutive days. This is the most dangerous state of a navigable river, where the current is not so deep and rapid as to keep up a continual scour; and it would certainly occur in the Thames, though to what extent it is impossible to say *à priori*.

The worst of the whole, however, would be the wharfs, or docks as they would then become upon a small scale. At high water, or rather in slack water, the water in them would have no motion; while their arched entrances would act as receivers of such impurities as may be in the river both above and below. The foulest matters in a river, though they are in many instances the most easily decomposed, and rendered quite inoffensive, always ride most buoyantly upon the waters; and if there are receptacles near at hand, they are certain to be deposited there, and if they are in great quantity, and ferment where they are deposited, the odour of them is very offensive. As we before hinted, the dwarf piles proposed by Colonel Trench would admit those matters which are carried at or near the surface of the water; and the slow discharge from these places would prevent their escape to the main current, so that they would remain and accumulate till the enclosures would become perfectly filthy.

Then, as the entrance to the wharfs is only to be three feet above high water, and as it must be covered for the breadth of the embankment and the roadway, which, together, we have estimated at fifty feet, the odour issuing from them would be such, that the nose of even a nightman would turn back from the rankness of this reek of putridity. What is to be done with the inner parts of the wharfs, and whether the coal barges are to be left to the open atmosphere—such open atmosphere as it would have, or to be penned up under a roof, like black pigs of larger growth in a Hampshire stye, we are not informed, though, to our olfactory perception, pigs always smell ranker in the stye than in the open farm yard; and consequently, we think that it would be as well to leave the permanent *loci* of the barges quite uncovered. Even then they would, on a hot summer's day, be nosegays of assafœtida and sterculia to the passengers on the roadway and in the colonnade, and even the steam-borne phaetons would catch a passing snuff of them as they careered along the cockloft railway.

Even the air and light gratings in the roadway and colonnade, whose glimmering would just enable the bargemen to get their craft foul of each other, would send up not the sweetest of all perfumes. In short, the whole would be a pretty mess, and one of Colonel Trench's impounded wharfs would soon become more pestilent than the whole exposed bottom of the Thames is at present. The only saving point in the whole matter would be that their days would speedily be numbered, and they would bury themselves in their own abomination, until the proprietors, whose business would of course be completely ruined, should give them more substantial intermination.

It may be worth while to mention some of the benefits which Colonel Trench enumerated in recommendation of the project when he first broached it in 1826. He then, as he says, stated "that it would improve the navigation of the river, and be highly beneficial to commerce!" (The points of admiration are the Colonel's own, not ours; and whether he inserted them to mark his astonishment at his own words, we shall not inquire.) "That it would unite the two extremities of the metropolis, and relieve the Strand, and Fleet Street, and Cheapside, from some portion of that crowd which renders that important thoroughfare dangerous—sometimes impassable! It would afford accommodation and recreation to all classes of the community, but especially to those operatives who reside in close and unwholesome quarters of this crowded city, while its beauty and magnificence would eminently contribute to the embellishment of the metropolis!"—p. 1.

Now we have shown that the navigation of the river would not be improved, and he himself states indirectly that the contrary would be the case. He says that the terrace on which the Houses of Parliament are built, has caused a silting up of the shores below, and it is upon the very same principle that his wharf-holes would soon be silted up also. Instead of doing any good to commerce, his project would ruin trade along a mile and three quarters of the London bank of the Thames. There might be a little diminution of the crowd in the streets, but this would be trifling, and the omnibuses, which are the greatest annoyances of the whole, would run as they do at present. As for accommodation or recreation, it would afford little to anybody; and as for beauty and magnificence, it is the very antipodes of them. He is quite wrong in the effects of the removal of old London Bridge; for though the water ebbs lower, and more of the bottom is exposed, it runs off more quickly, and therefore the scour is greater, and the shore is cleaner, except where there are eddies, which would be formed at intervals along the whole line of his embankment. The scheme is thus a mischievous, as well as a quixotic one; but it is a consolation that such a scheme never will or can be carried into effect.

Sir Frederick Trench thinks differently, and so he expresses an earnest wish that the vast surplus should be laid out in improving the navigation and ornamenting the banks of the river. A spacious opening up to St. Paul's, and an embankment along the Surrey side, are among the progeny which he makes sure of obtaining from this scheme; and so confident is he, that he entreats that no joint-stock company, and no chancellor of the exchequer, of whatever politics,

may lay claws upon this most magnificent treasure; but, as a late Lady Mayoress is reported to have said to her lord, when he expressed apprehensions, upon hearing the explosion of a powder-mill at Hounslow, that his own sapience had set the Thames on fire, "My dear, you may keep yourself perfectly easy on that point."

Note.—In our notice of this scheme we forgot to make any mention of what Sir Frederick Trench calls "Logic;" it is his estimate of the time and number of men required to do a given piece of work: "If," says he, "one man can do any piece of work in a hundred years, then a hundred men will do it in one year." This may be logic according to Cocker, but according to common sense it is not fact, for there is a condition wanting,—that the work be such that all the men can be employed on it at once, without any of them being in the way of another. Thus, for instance, though one tailor could make a smart pair of galligaskins for Colonel Trench in twenty-four hours, four-and-twenty tailors could not make them in one hour; and though one dress-maker might, in the course of the same time, make a lady's gown, wadded, puckered, and trimmed, up to the very tip-top of the fashion, yet four dozen of dress-makers could not do the same during the half hour the gallant Colonel were waiting to fetch it home. Therefore we desiderate the condition alluded to before we can admit the soundness of the Colonel's *logic*. There is another calculation of the same honourable and gallant gentleman, which, though it is the reverse of this, is open to the same objection: it relates to the division of a greater power into lesser ones; and is not more absolutely true, than that a great goose egg divided into quarters may be hatched so as to produce four widgeons. The Colonel's idea of analysis, at least as it has been represented to us, is the resolving of a Bude light into 240 penny candles; and it is alleged that he is to recommend the illumination of the House of Commons by these instead of that. At present, we believe, the honourable House is illuminated by a single Bude light, the contrivance of Mr. Hudson Gurney. But it appears, at least from the report sent us—for the absolute truth of which we are of course not answerable,—that our projector wishes to equalize the illumination of the House by parting it into the 240 penny candles. This is only a little more than one third of the number of members, to every three of whom a candle may be allowed, every third man carrying a pair of snuffers in his pocket; while the surplus candles will illuminate the Speaker, the table for the clerks, and the bar, and almost admit of one or two to be carried in horn lanthorns, when the House or deputation is summoned to the bar of the Lords. In the way of physical light, this would be equality with a vengeance; and we have no doubt that in the matter, if true, Sir Frederick Trench is playing off a bit of waggery against those lengthy speakers who are all flash and no force. The great men in the House, like the Areopagites of old, would be as effective in the dark as even under the full blaze of a Bude light; but there are other members of whom the whole interest would be lost, if their gesticulations and physiognomy were not displayed. It is therefore great kindness to such on the part of Colonel Trench to assign each triumvirate their penny candle, because by this means they may be all seen by their own light and in their true colours. We wish Sir Frederick Trench success and joy in this and all his other speculations—the mangling and disfigurement of the Thames excepted. In the case of that noble river, let him beware of wilful fire-raising.

COLLEGE FOR CIVIL ENGINEERS.

We have had occasion more than once to notice this establishment of lofty pretence; to point out how completely it had degenerated from the original plan proposed by Colonel Jackson; how, in the state in which it was begun, it would never be of use to the engineering profession; and how its inutility would soon cause its decline and fall. The fact is, that after its directorship passed out of the hands of the gentleman we have named, we never could look upon it as any thing else than a mere boarding school, seeking to establish itself by high patronage, and money obtained, not legally under false pretences, certainly, but money to which it had no very legitimate title as a school.

It is not with any of the parties that we feel the slightest reason to be dissatisfied; nor do we in the least impugn their respectability in anything whatsoever. We did indeed once gently remonstrate with one of the professors, for calling himself Professor Wallace, without having what we conceive to be a legitimate claim to the title. But it seems that, among a pretty numerous class of persons, the old titles have been brought down and applied to very different occupations from what we, in the simplicity of our antiquated notions, considered the original and only true ones. Now, however, a man who scrapes on the fiddle, or blows the flute, and teaches others to do the same, is a professor of music, though he is very different from those who were originally so called. A man who teaches quadrilles and shuffling—we mean with the feet, not with the cards—is a professor of dancing. It was only in our last number that notice was taken of a professor of hair cutting. Nor do we despair of hearing of a professor of beer-drawing, or even a professor of idleness itself. Now, among these pseudo-professors, who have been all admitted, or are admissible, into the vocabulary, a schoolmaster must be confessed to hold a high and honourable place, and to be nearer to a professor of the old genuine class than any of the others. In like manner, the name of College has been taken down from its original signification, and has come as low as the once famed College of Buckhaven, or the British College of Health—which last is nothing but a manufactory and shop for the making and vending of quack medicines.

Considering that all these epithets are received, we do not see why we should not allow the College for Civil Engineers to pass muster, as well as the College of Health, only there is a little error in the name of each: the College of Health does not practise or distribute health, and the College for Civil Engineers does not practise or teach civil engineering, and the profession regard it as being *against* them, rather than *for* them. There are, however, professors of civil engineering springing up or being established in the legitimate colleges, and they will teach the principles of the *science* as a portion, and a most useful portion, of the general philosophical course of liberal education; but they will not, as the teachers at Fulham seem to do, profess engineering and practise mere schoolmastering, nor will they take apprentices in that department of the art, which can be learned only in the office and employment of a professional engineer.

This is the whole amount of the charge which we have to bring against the Fulham College—for that is the name of the appropriate locality. The inhabitants of the adjacent villages and hamlets are in the habit of saying that, when they find themselves in a narrow or unknown street or lane, and ask how far it is to Fulham, if certain

words of "vulgar augury" are given as the response, they know that they are already in Fulham. Far be it from us to hint that such words break from any of the inmates of Fulham College; but we think they might go the length of the Buckhaven reply, to any one who asks for the College: "Give me half-a-crown, and I will shew you the two sides of it;" and, having got the half-crown, and held up to the inquirer first the obverse and then the reverse, they may put the half-crown in their pocket, saying, "Now I have shown you the two sides of it, have I not?"

A correspondent informs us that there has been recently an examination of the pupils at this school, but instead of being a public display before real engineers, by their juvenile but aspiring successors, it was private, or indeed almost secret, for it was conducted by some of the masters in the presence of none but the pupils and their parents. Prizes were pretty numerously given to the boys—but this, our correspondent says, was done to sweeten the parents; make them give praise among their acquaintances, and so bring grist to the scholastic mill. Our correspondent further says, that a professor of more lofty grade was invited either to examine or sit as umpire, but that, after arriving and seeing what was there, he declined to interfere, and we heard even to remain. We of course do not vouch for the whole truth of our correspondent's statement, because we are not certain he was there; but the private nature and the modes of the examination, we are inclined to think, bear out all that we have asserted as to this being only a school.

Viewing it as such, we have some little exceptions to take to it besides that of the misnomer. Noblemen and gentlemen have an undoubted right to give their money and their patronage to anything they please; but it is not quite the thing, even in them, to patronize an establishment under one name, when in reality it deserves another, and a different one.

LOWNDES SQUARE.

(WITH PLANS OF TWO OF THE HOUSES.)

As far as windows are concerned, there is indeed one adverse circumstance which greatly interferes with any attempt at dignity of style in private houses, even when several separate dwellings are combined together, so as to produce (as in Lowndes Square) an otherwise well-proportioned and imposing architectural mass. We allude to the necessity, or supposed necessity, of making the piers so narrow in proportion to the windows, thereby occasioning a too crowded and squeezed-up appearance, sadly at variance with artistical breadth and repose. On the part of the architect himself, the necessity is real, because he must in this respect comply with the prejudices of those who are likely to become tenants; and as the window tax does not operate as a check upon the prejudice now generally entertained in favour of three windows in breadth, consequently as many in the front drawing room, it is hardly to be supposed that any considerations of taste will prevail.

The imaginary necessity is that—no matter whether the frontage will properly admit of that number or not; no matter whether it be towards a very narrow street or a very wide one—a mere lane or a open square; no matter whether the aspect be north-east or full west—unvisited by the sun or exposed to its afternoon blaze; it would seem that every front drawing-room *comme il faut* must, as matter of etiquette, have three windows, though one side of the room shall, in consequence, be rendered almost entirely window; and consequently the room itself, in some aspects at least, be all the colder in winter, and all the hotter in summer.*

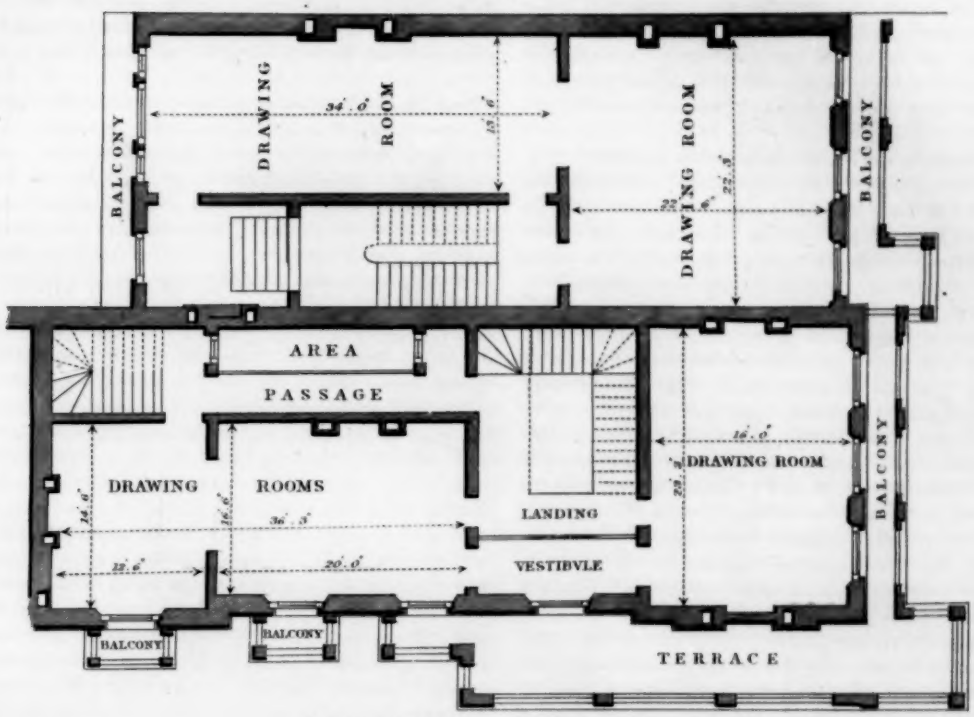
The number of windows is considered every thing, the breadth of the piers nothing; nevertheless, we should say, leaving external appearance out of the question, that scarcely any thing conduces so much to nobleness of character within, as does space between the windows, space not only for ample draperies, but for furniture also. Whatever may be the general opinion, it is ours that a room may be too light, as well as too dark; and in the former case there is a raw, gloomy, sometimes almost chilly effect, or else a scorching one, the very reverse of either the picturesque or the comfortable, in character.

Hardly do we expect to make any converts, or to bring others over to our way of thinking on this particular point, but we should say that the elevation of the houses in Lowndes Square would have been all the better had there been only two windows where there are now three. We admit, however, that this would have occasioned a serious difficulty, or disadvantage, in another respect, because, in such case, supposing the frontage of the houses to have been the same as at present, there could have been only a door and a single window on the ground-floor, consequently the front room on that floor could have been only a secondary one, and the dining room must have been at the rear of each house, yet, while the smaller room in the front would have somewhat abridged, on the other hand, greater width would have been obtained for the vestibule. We ourselves have no objection to such arrangements, because the look-out from the windows of a dining-room is of comparatively little importance, such room being used, at least when company are present, eight months out of the twelve, by candle-light only. Besides, the very best prospect of all, at any time, in a dining-room, is, the prospect of a good dinner. Never will your guests complain of your architect, so long as your *chef de cuisine* does but put them in good humour.

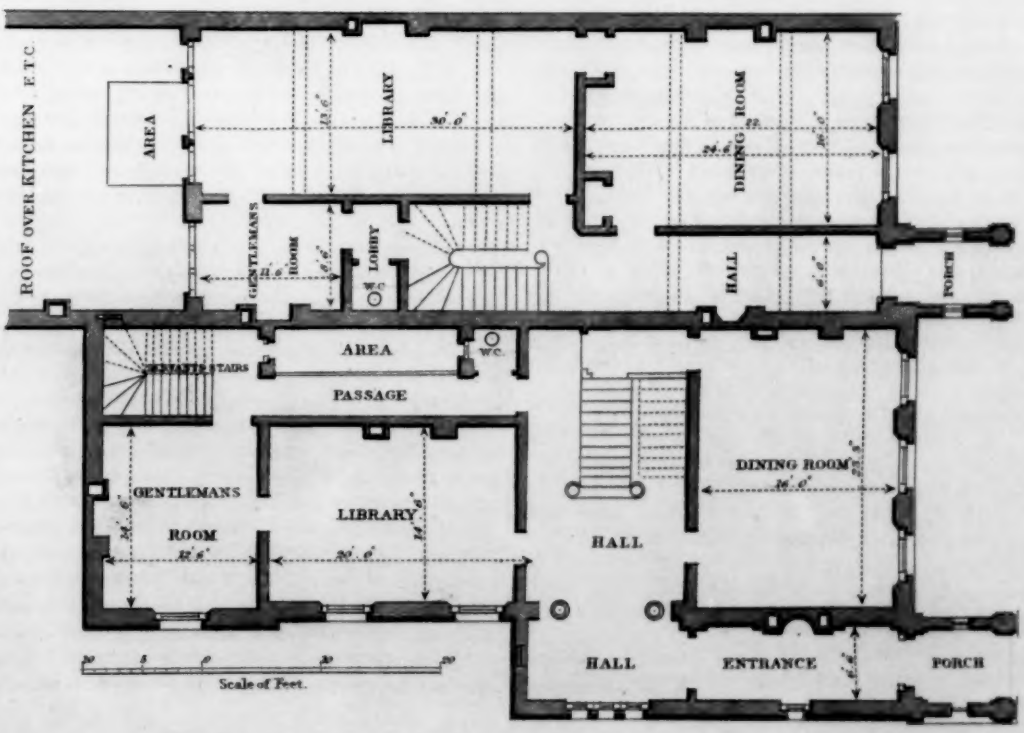
Having thus begun to touch upon the subject of internal arrangement, we may as well pursue it; nor need we say that, owing to the very limited frontage even in the superior class of London houses, it is exceedingly difficult to plan them with regard to effect as well as convenience, and so also as to obtain greater variety in the disposition of the principal floor, than the ever-repeated front and back drawing-room, with perhaps a smaller third room at the rear. Still for this very reason do we feel some surprise that no one has ever published any designs and plans for the express purpose of suggesting ideas as to the laying-out town houses of a superior class, yet at the same time on a far more limited scale than some town mansions, which, though they may not be at all distinguished by their external appearance, must be considered as exceptions from the general rule. We do not say that it would be very easy to accomplish such a task successfully, since most assuredly it is not every one who is equal to it,—a *raison de plus* wherefore it should be attempted by some one who is so; at least, we fancy that most people require instruction and assistance most in those

* As one advantage attending the having only two windows in the front drawing-room, and a very wide pier between them, we would call attention to the effect that may there be obtained by placing the folding doors communicating with the back drawing-room, that is, if the plan will admit of its been done, immediately opposite the central pier, with a large mirror against the latter, so as to reflect the view across both rooms, and thereby produce a greatly extended vista in that direction. To accomplish this, we would not scruple to block up within-side the centre window of a front drawing-room, placing the mirror in the door-way between the other two, so that of an evening, the time when the drawing-room ought to make the greatest display, the illusion would be complete, and the effect of a suite of four rooms from back to front be obtained.

MANSIONS IN LOWNDES SQUARE, KNIGHTSBRIDGE.



ONE PAIR FLOOR_PLAN



GROUND FLOOR_PLAN

Engraved by J.Dower.

Published by W.S. Orr & Co. Amen Corner, Paternoster Row, Oct.1 1841.

things wherein they are deficient; instead of which, books of original designs generally consist of such as any one could produce, and which it would require no very great talent to surpass by many degrees.

At any rate, there is one thing that ought to recommend a work of the kind suggested, that is, supposing it well executed, namely, that as far as it was useful at all, it would be one of every-day use, because private houses are constantly being built. In one view, even the difficulties attending such subjects are upon the whole rather favourable to the architect than not, because, if he once sets about breaking through the common and monotonous routine system, now pursued as matter of course, he finds himself driven to various contrivances, most of which might be converted into so many beauties, and made to produce novel and tasteful effects; and, were but one good fresh idea thus obtained from time to time, the acquisition would be highly valuable. Further than this we cannot here explain ourselves, not because we feel ourselves utterly incompetent to shape out any idea of our own for the purpose, but because the present is not the place for doing so, nor could it be done at all without numerous explanatory drawings.

We will, therefore, now proceed with our more immediate subject, and examine the plans of the two houses in Lowndes Square, given in the plate. That at the south-east corner (the lower one in the engraving,) is somewhat larger than the other, and possesses the advantage of having one front towards the square, the other towards the street; and is also extended below by the entrance being there brought out beyond the upper part of the house, by which means a terrace on the level of the drawing-room floor is obtained over that vestibule. This portion of the plan is exceedingly well managed, as it produces not only a certain degree of effect, but an air of comfort also. Distance, or the appearance of distance, between the porch and hall, is increased: the latter acquires more importance by not coming into view till after the entrance corridor has been passed through; that is, not coming distinctly into view, for enough is seen on first entering the house to indicate that a more spacious vestibule lies beyond the narrower avenue. Neither the staircase, nor the doors opening into the dining-room, &c., are at all exposed, while the former displays itself very favourably as first seen through the columns, which serve in some degree to screen off that portion of the hall, and give an air of greater privacy and comfortableness to it.

The value of the circumstances we have called attention to, will be best appreciated by considering how materially this part of the plan would be altered for the worse, by putting the entrance where the hall window now is: either that part must be screened off, so as to form a small outer lobby, consequently, the other contracted by so much being taken from it, or the staircase and the room doors exposed to the outer entrance. It is true, had the entrance been so placed, the dining-room itself might have been extended, by taking into it the space between the front and the hall, making there a deep sideboard alcove, (not so wide as the room itself, and opening to it either through an arch, or between columns,) leaving the projecting porch just as it is at present externally, but converting it into a staircase for servants, from the dining room to the offices. By a little more contrivance, in the space on the other side of the alcove, between that and the hall, the entrance from the street might be placed so as to get a small lobby between the outer door and hall itself, thereby obviating the objection against exposing the staircase, &c., as above-mentioned. Still, we do not say that this would have been upon the whole an improvement, because, if something had been gained one way, as much, perhaps, would have been lost the other. Accordingly, the change we have pointed out as being very feasible, is to be considered only as a variation of the same theme, that might be applied elsewhere under similar circumstances.

On beginning to ascend the stairs, a rather novel and very pleasing effect is obtained, for, on looking up, we then see to the very top of the house, where there is a gallery with small open arches, and coffers in the ceiling, filled with stained glass. This gallery is a corridor on the attic floor, carried round the upper part of the staircase, and forming a lantern to cover it, this principal staircase leading up no higher than to the second floor.

Having ascended the first flight, another sparkling and well-managed effect comes into view, namely, a rich stained glass window in three compartments, in the screen dividing off a portion of the landing, so as to obtain a small lobby, connecting together the drawing rooms. Besides the convenience produced by this direct communication apart from that across the staircase, this last is considerably benefited also; and that not merely in consequence of the effect just noticed, but because the light in this part of the staircase is subdued, and accordingly the lantern over head is set off to greater advantage. Again, although the portion of the landing cut off by the screen is so much taken away from that space, such contraction of it appears to us very judicious, inasmuch as it is desirable on its own account, because—as will, we think, be admitted, upon looking at the plan—the drawing-rooms would else have appeared smaller than they now do in comparison with the staircase itself, which, on the other hand, would have seemed to take up too much of the house.

There is, however, one circumstance in the plan of this floor which we could have wished otherwise, for we think that as far as the larger drawing-room is concerned, it would have been an improvement had the door opening from the staircase been immediately facing the centre window; this might have been accomplished by bringing out the first flight a little forwarder in the hall, so as to obtain there two or more stairs, which, with a couple of windows above, would have reached the landing sooner, so as to allow the door to be placed as above indicated; and this being done, it would have been advisable to make the door opening from the drawing-room into the lobby a jib one, so as to show only a single door, and that made a central feature on the side of the room facing the windows. Some disadvantage would attend such change, because the view through the other drawing-room into the further one would have been lost, unless the door opening from the staircase into the first had been shifted accordingly, so as to be still in a line with that of the larger room. The greatest objection of all would be, that the entrances to the rooms would be less commodious than at present, as the doors would then come too immediately upon the open part of the staircase, and the railing around it.

We will not pursue our remarks on this plan further, having left ourselves room but for very few relative to that of the other house. This latter, however, does not call for much comment, there being nothing at all remarkable or unusual in its arrangement. In some respects the accommodation is greater, although it contains fewer rooms. The side-board recess* gives the dining-room in this house a decided advantage over, and likewise more character than

* The effect, however, of a recess is here in some degree lost, the cornice of the ceiling being made to break and follow the plan, instead of being carried across it; owing to which the closet, &c., have too much the appearance of projecting *into* the room.

that in the first one. In the greater spaciousness of the library the superiority also lies on the side of this residence; while the communication between it and the other room through a space between double doors,—therefore both excluding sound, and giving the idea of great thickness of wall,—is upon the whole an advantage. There is also in this plan something more in favour of the first-floor plan, the back drawing-room being equal in length to the two smaller ones in the first house. It appears to us that this also might have been divided into two rooms, cutting off from it a smaller square one—not for a sitting-room, but a mere ante-room, lighted by an ornamental lantern or dome skylight, and opening by folding doors into the drawing-rooms. By this means, while scarcely anything at all would have been lost as to space, much would have been gained as to variety; for while the two drawing-rooms were alike as to decoration and hangings, the smaller intermediate room might, with great propriety, have been treated differently in character—somewhat more architecturally, and with perfect regard to symmetry—folding doors on two of its sides, and two other doorways opposite each other on the remaining sides, the one facing the door from the staircase being filled by a large mirror, thereby producing the effect on entering of another room seen through an open doorway. In such case there could, of course, be no chamber of any kind immediately over the ante-room; whereas, at present, there is an intermediate room between the front and back bed-chambers, which is lighted by a window towards the staircase, and placed at some height from the floor. Notwithstanding, therefore, that we have pointed out how a plan thus arranged might be treated, we doubt whether it would have been any improvement in this case, and that not only for the reason just assigned, but because the back drawing-room is a particularly pleasing and cheerful one, nor would it bear any curtailment as to length, without in a great degree forfeiting what gives it that character. One great advantage enjoyed by this room and the library below, is, that they happen to face the south, which is not the case with any of the rooms in the corner house; there is also more variety shown in the decoration of the ceilings of the principal rooms.

ON THE NEW INSTRUMENTS FOR ASCERTAINING THE AREA OF PLANE FIGURES WITHOUT CALCULATION.

Seldom has a contrivance of such extensive and remarkable utility been introduced into the practice of any profession, as that of which surveyors have lately become possessed, under the name of the New Scaling Instrument.

Simple to a degree as a mechanical contrivance, the results which it brings out are unrivalled for accuracy, while the process of using it is devoid of all confusion or intricacy, and the surveyor cannot fail to derive great pleasure from the perfect ease with which he finds himself performing a task, which, under the old system of calculation, was not unreasonably dreaded as the most unsatisfactory, wearisome, and perplexing of his office labours.

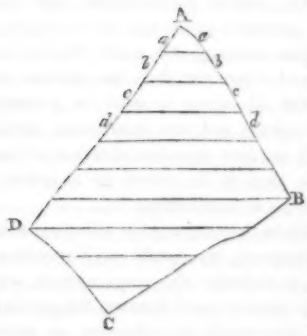
Many an excellent fieldman, many a surveyor who perfectly understood the geometrical relations of lines, and who could frame his construction in the field at once, in the most direct and judicious manner, for all the purposes of a correct survey, was yet, either from inattention, clumsiness, or want of patience, utterly incompetent to ascertain, correctly, the areas of his fields when plotted. Let it not be objected with a sneer by the smooth-surface and fair-weather surveyors of Norfolk, Suffolk, or Lincolnshire, that a man who could not properly scale his work by measurement of triangle and trapezium, was unfit for a surveyor, and that the profession was in no way benefited by a contrivance which places such incompetents on a level with the more nimble and delicate-fingered of their brethren. Let us remind our friends of Norfolk, and the other eastern counties, that their fields are of moderate size, that their boundaries are usually straight lines, that a crooked fence is a *rara avis*, and therefore, that with a pencil and a scale, they may be expected to scramble over a great many more numbers, and to calculate in the course of a day a great many more quantities, than if they were placed at the same work on a Cornish, Devonshire, or Welsh map. In these delightful regions, few and far between are the *straight* lines, each fence being crooked as a corkscrew, and each enclosure either cramped and dwarfy, or long, winding, and twisted to a degree highly torturing. Is it reasonable to suppose, that the slow and tedious process of dividing into triangles and trapezia, and of multiplying base and perpendicular together, can proceed with equal rapidity on these maps and on the others we have mentioned? And more important still, is it likely the results can be equally correct; when, from the far greater number of balancing lines, of figures, and of calculations for each field, the chances of error are at least tenfold?

Before a surveyor in one part of the country, proud of his local name and fame, shall plume himself on his superiority to less fortunate practitioners in more difficult counties, let him at least understand the difference in their circumstances, and it would be well, before condemning them as ignorant and incapable, if he could say himself, "I too have laboured on their soil, and know from my own experience what difficulties they have to contend with."

To surveyors every where, but more especially to those who practise in districts which are difficult and troublesome to survey, the invention of this instrument is a boon which cannot be too highly valued. We do not hesitate to say, that many a surveyor in the West of England has been saved from bankruptcy and ruin by its means; a fact that will not excite much surprise, when we consider that many Cornish parishes have been contracted for at about 6*d.* an acre, of which the computing alone was worth at least 2*d.*, whereas it may now be done in one-tenth of the time, at a cost of less than a farthing per acre. In a district of 60,000 acres (and many surveyors have as much as this in hand), the saving would amount to upwards of £437, besides the advantage to the surveyor of being able to finish his work and obtain payment for it, many months sooner than he possibly could have done, had his areas been ascertained by calculation.

The principle on which these scaling instruments are constructed, and on which their accuracy depends, may be expressed in general terms as follows: *That any plane figure being divided into rectangles by equidistant parallel lines, its area will be equal to the united length of all the rectangles multiplied by the fixed distance between the parallel lines.* If we make the fixed distance between the parallels equal to any unit, and take off the entire length of the rectangles from a scale whose unit is similar, it is evident that we obtain at once the area of the figure in square units, in which manner areas are usually expressed.

Thus let A B C D be a figure whose area is required. If we now apply parallel lines to it, distant one foot from each other, and add



into one sum the lengths between the parallels, as *a a*, *b b*, *c c*, &c., we shall obtain the area of the figure in square feet. Next, suppose the distance between the parallels = 2 feet, and adding the parallelograms together, as before, we have the area of the figure equal to one parallelogram, say 40 feet in length and 2 feet in breadth; this, of course, is equal to another parallelogram 80 feet in length and 1 foot broad, which is the same thing as 80 square feet. But if we measure the length of the parallelograms with a scale whose unit is one half the double unit between the parallel lines, it is evident that the length so measured will then give the area at once, without multiplication, because it is clearly the same thing, whether we first find a length equal to 40, and multiply it by 2, or whether we measure the length at once by another scale, which, in the length of 40 in the first scale, contains 80 divisions—in either case the result will be 80. Again, if we make the fixed distance between the parallels quite arbitrary, as *d*, and call the entire length of all the parallelograms *l*, the area will be *l d*; then, in order to express the area at once, without multiplication, we have $d : 1 :: 1 :$ the unit of l; that is, the unit of l must be equal to $\frac{1}{d}$.

This explanation is necessary, in order to understand the difference between the two kinds of instruments which have been introduced for the determination of areas by taking the lengths of the parallelograms as just described. One of these instruments is extensively manufactured by Messrs. Troughton and Simms, for the use of the Tithe Commissioners, and is calculated to read off the content in acres, roods, and perches, from the measurement of parallellograms one chain in breadth. The other instrument, usually called *Mason's* from the name of the inventor, is calculated to read off also in acres, roods, and perches, but from the measurement of parallelograms *two* chains in breadth. We shall now describe each of these instruments, and the mode of using them.

Troughton and Simms's instrument is principally made for the *three* and *four* chain scales, and consists of a piece of boxwood divided into lengths of 10 chains of the required scale, each of such lengths being of course equal to one acre. The acre is subdivided on the scale into four equal spaces, each of which is a rood. Sliding on the scale is a piece of brass, containing a length of one rood divided into 40 perches, and having attached to it a hair, or fine wire, stretched tight in a vertical position, for the purpose of equalizing the oblique, or sometimes ragged ends of the parallelograms. Figures 1 to 4 will enable the reader to understand the construction of this instrument, with the mode of division. The only difference between those for the *three* and those for the *four* chain scale is, that the former contains 5 acres from left to right, and 5 acres more divided from right to left, making in all 10 acres; while the four-chain instruments contain 10 acres divided each way, making together 20 acres.

In proceeding to use the instrument, it is necessary to be prepared with a piece of transparent paper, either of the kind called tracing paper, isinglass, or horn paper, ruled with lines one chain apart, that is, one third of an inch or one fourth of an inch apart, according as the areas to be ascertained are drawn to the three or four chain scale. About 10 inches by 7 will be found a convenient size for the paper, and it should be ruled with lines vertically as well as horizontally, for a reason which will be presently explained. In practice, horn paper, or isinglass paper, will be found most convenient, as it will lie flat on the paper and only require one weight, while tracing paper cannot be used without two weights; and again, of the two, isinglass paper or horn paper, the latter is much preferable, as it does not imbibe moisture, and is therefore not liable to expansion and contraction like the other, which requires constant allowance to be made for the error so arising. Horn paper is the material used for the forms in a mechanical kind of painting or stencilling termed *poonah painting* or *oriental tinting*, and may always be procured of good quality at Ackerman's Repository, Strand, or at Newman's in Soho Square.

Fix the transparent paper on the field to be measured with the parallel lines intersecting it in a diagonal direction, as shown in figure 1, and lay the instrument with the part *a a* (fig. 3), coincid-

Fig. 1

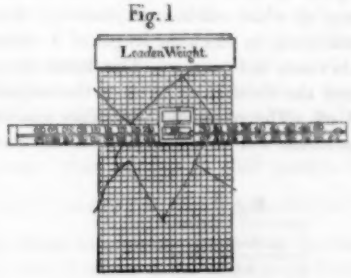


Fig. 2.

Fig. 3

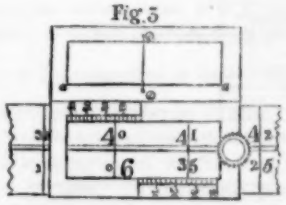
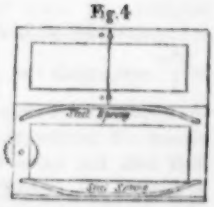


Fig. 4



ing with the first parallel line, the slide being pushed up to the left-hand end of the scale as far as it will go, that is, till *zero* on the slide coincides with *zero* on the scale. Place the instrument now in such a position that the hair of the slide shall equalize the end line of the first parallelogram, that is, shall take into the parallelogram as much on one side of it as it excludes on the other. This is an operation which surveyors perfectly understand. Press the instrument, now, firmly on the map, and move the slide to the other end of the first parallelogram, where the line bounding it must be equalized as before.

The reading on the scale is now of course equal to the area of the first parallelogram, but this is not to be put down, but the instrument, without moving the slide, is to be carried on to the next parallelogram, and the operation repeated through the whole figure, when the last reading will be its area.

Should the content of the figure be more than 5 acres, the slide will arrive at the end of the scale before the measurement is complete, and the place on the transparent paper where this happens

must be noted (which can readily be done by means of the vertical lines ruled on it), and the instrument moved to the end of the parallelogram in which the moving of the scale has been stopped.

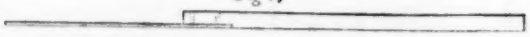
The slide must then be moved back to the point noted, and the backward movement of the slide continued through the succeeding parallelograms, commencing during this movement from the right-hand end of each parallelogram.

Should the slide reach the 10 acres, the point must be noted as before, the whole instrument moved to the left-hand end of the parallelogram, and the slide moved forward to the point noted; and so the process may be continued for the measurement of any figure, however large. A little practice will soon enable the most inexperienced novice to use this simple instrument with accuracy and expertness.

Mr. Mason's instrument is, if possible, a still simpler contrivance: it consists of a piece of box-wood without any fixed slide, and the only divisions on the instrument are those of acres, which, on the principle before explained, are made by divisions 5 chains apart. The slide for this instrument is detached, and moves by the side of it: it consists of a piece of horn divided by a vertical and two diagonal lines (the use of which will be seen presently), fixed by rivets to a piece of box-wood, on which the length of 5 chains or one acre is divided into roods and perches. This forms the slide by means of which, and the divisions of acres on the instrument, the contents are read off. The remaining particulars relating to the form of this instrument will be understood on reference to figures 5, 6, and 7.

Fig. 5

Fig. 7

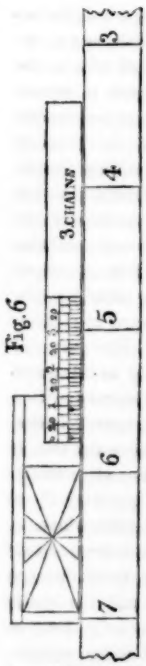


The transparent paper to be used with it must be ruled with lines two chains apart, and vertical lines are unnecessary. The paper must be placed diagonally as before described, and as shown in figure 5, and in such a position as to avoid encountering very oblique lines at the ends of the parallelograms. The instrument is divided from right to left, so that the successive measurement of the parallelograms must be made also from right to left.

Place the instrument with its edge coinciding with the first parallel line, the slide being held close to the instrument, with the *zero* of both coinciding. In this position the end boundary of the first parallelogram must be equalized, and this may be done either by the vertical line on the horn, or by one of the diagonal lines, it being obvious that the one which most nearly coincides with the boundary will be the most convenient, and will effect it most correctly. The first boundary being equalized, hold the scale firm, and move the slide to the other end of the first parallelogram, where the boundary must be equalized as before.

Press the slide now close to the instrument, and move the

Fig. 6



whole into the second parallelogram, and so continue the operation to the end of the figure. This instrument contains 10 acres, divided in one length, and when the slide has arrived at the end of the 10 acres, it must be pressed tight on the paper, and the instrument itself moved on till its *zero* coincides with that of the slide, which is then to be moved on as before, and always in the same direction.

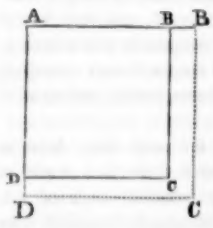
With respect to the comparative advantages of the two instruments, we should say Troughton and Simms' is probably the most correct, on account of the smaller space between the parallel lines, but is not capable of peforming so great a quantity of work as Mr. Mason's. It is obvious that, in measuring any surface, the slide of the one instrument, adapted for *one*-chain parallels, must pass over twice as great a length as the other, which is adapted for *two*-chain parallels; yet it must not be supposed that on this account the one will effect double the work of the other: this cannot be done, because, notwithstanding the great ingenuity of Mr. Mason's contrivance for equalizing the boundaries of his parallelograms, by means of lines on the horn of the slide, the balancing by his instrument occupies a longer time than with the other instrument. The avoidance of all complication from the alternate forward and backward movement of the slide, is a great advantage in Mr. Mason's instrument, which, as we have said, only requires the slide to be moved constanly in one direction. It being obvious, however, that in principle both these instruments are alike, we propose to consider of what advantage they are likely to prove in carrying on future surveying operations. It is a fact well known to surveyors, that in very close districts of country, to say nothing of towns, the 4-chain scale is too small for correct computation by the old method, and it was consequently seldom resorted to, that of three chains being almost universally preferred. In all computations, it has been usual to allow a certain small proportion of the area, for the difference that would be made by two computers, or by the same person computing the same fields twice ever. Surveyors are not agreed as to the allowance which should be made in this way; some being satisfied if the quantities agree within about $\frac{1}{200}$ of the whole content, and others insisting on an agreement within $\frac{1}{600}$, or nearly half a perch per acre. According to the old system of scaling fields, this difference was to be expected, because those bounded by straight lines could of course be more correctly scaled than those with very crooked and irregular boundaries. But in computing with either scaling instrument, the boundary, whether crooked or straight, is of little consequence; and as a general rule, it may be taken that a three or four chain map may, with care, be computed within $\frac{1}{600}$ of the true area, so that two computations of the same field, if made with a due allowance for contraction or expansion of the paper, ought not to differ from each other more than the 600th part of the area, or about one perch in four acres. It hence arises, from the superior accuracy of these scaling instruments, that maps on a smaller scale than four chains to one inch, could be computed with sufficient accuracy for every purpose connected with the purchase or exchange of hands. Supposing that in a large survey the scale could be diminished

even from a four to a five-inch scale, the saving of time in plotting would be considerable, and the paper required would be only $\frac{4}{5}$ of the size. The convenience of working at a small map is much greater than that of being burdened by a cumbersome unwieldy roll of paper; and this latter annoyance is doubly felt by a surveyor in temporary quarters at a distance from home, and unprovided with the appliances of his own office. It is well known that when maps have been reduced from an original working plan, say to a five or six-inch scale, however correctly the reduction may have been made, it is almost impossible to arrive at any thing like correct quantities by the old practice of scaling. But by means of these instruments, maps on the reduced scale may, with care, be computed with astonishing accuracy.

By the old method of scaling, it has always been held a very troublesome operation to divide or partition off large fields on the map, into small plots of any required size. The readiness with which contents may be ascertained by these instruments, will greatly assist surveyors in this operation. The process is so simple, that any person at all accustomed to use the instrument will at once devise for himself the best means of effecting it.

To compute quantities from tracing paper was always difficult; and when once balancing lines had been drawn on the tracing paper, they could not be rubbed out in order to divide the field into new figures. This rendered the operation difficult and unsatisfactory, and the accuracy of the first process could not be checked. But with either of the scaling instruments, it is quite practicable to compute an entire map from tracing paper, as correctly as from the original. The most convenient way of doing this, is, to have a piece of white paper ruled with the parallel lines, and to make the tracing paper on which the plan is drawn the moveable material, so adjusting it, that the parallel lines on the white paper shall intersect diagonally: the fields to be measured as above described. The great reduction of price for which the measurement of areas may be effected by this new contrivance has been already alluded to, and second probably only to this in importance may be ranked the means which it affords of ascertaining the areas of almost an unlimited number of enclosures in a given time. According to the old system of computing by measurement and calculation, three persons were necessary to the regular and rapid performance of the work, namely, one to scale and read off the measurements, one to write them down and calculate, and a third to check or calculate against the other. This number of hands was necessary where the fields were easy to scale; but where they required much division and balancing of lines, two were sufficient, because, while one was scaling and reading off, the other could calculate the quantities twice over, thus checking himself. Now, whether two or three hands were required, it is quite certain that their progress during the day would be surpassed in less than one-third of the time by one expert scaler with the instrument. It was extremely inconvenient for more than one person to be scaling under the old system from the same map; but in using the instrument on a large map, several persons scaling at the same time, will not impede the progress of each other. On a map of 10,000 acres, the computation might be performed by three competent persons, at the rate of 600 acres per hour, or the whole map might be computed in less than seventeen hours. The experience of many surveyors will bear us out in asserting, that by the old system the scaling of such a map was not considered a bad month's work. But there is a possibility with the instrument of making still more rapid progress, for great part of the map might be traced off in sheets of tracing paper, which, being handed to six or seven different scalers, the whole work might be performed in about five hours.

It has always been customary with the more exact and scientific among surveyors, to estimate the contraction or expansion which may have taken place since the plotting of the map up to the time of computation, and to make a corresponding addition to or deduction from the measurements. This precaution is so necessary, and the method of scaling is now reduced to so much accuracy, that to neglect the alteration in the areas by contraction or expansion is now quite inexcusable. We proceed therefore to show how it may readily be estimated. Suppose a line which has been originally laid down on the map, of the length from A to B, should be found to have contracted to the length A B, then a square space, which originally would have been represented by A B C D, will now only appear as A B C D; hence, in order to find the correct area, it is necessary to add to the latter space the difference which shall make it equal to the larger. This difference may be found by taking any length as originally plotted, say 85 chains, and suppose this length has contracted to 84·50; then, if we take the square of 85 chains, or 722¼ acres, and deduct from it the square of 84·50, or 714·025 acres, the remainder 8·475 acres will be the contraction in 714 acres. This amounts to 1356 perches in 714 acres, or to $\frac{1356}{714} = 1\frac{3}{10}$ perches per acre. A contraction of one link in 10 chains, makes it necessary to add 3·199 perches to every 10 acres, and as the allowance to be added is in direct proportion to the amount of contraction, it follows that x links in 10 chains, will require an allowance of x (3·199) per 10 acres; this multiplier may, in practice, be changed into 3·2; hence arises this formula: Let c be the contraction in links in any length, as l chains, then $\frac{c32}{l}$ = allowance in perches per 10 acres. This formula is very simple, and gives the contraction with sufficient accuracy, without the trouble of squaring any of the lines, as measured before and after their contraction. Of course the process for finding the amount of expansion will be the same, only that the allowance must here be deducted, in order to bring the areas down to what they were originally plotted. The best means for arriving at the correct contraction or expansion of a map, is, to rule across the map, at the time of plotting, two lines in opposite directions, and mark on each of these a standard length, as 80 or 100 chains, and from these lines the alteration in the area of the paper should always be estimated, when quantities are to be measured from the map. This prevents errors from incorrect measurement and plotting of the construction lines, and may always be relied on, as a correct test of the state of the map, however long a time it may have been plotted.



Explanation of the Cuts.

Fig. 1. A plan of Troughton and Simms' instrument, showing the ruled paper, &c. (Scale one-tenth.)
— 2. A cross section of ditto, half size.
— 3. A plan of the Slide and part of the Scale, ditto.
— 4. A plan of the underside of Slide, ditto.
— 5. A plan of Mr. Mason's instrument, showing the transparent ruled paper weight, &c. (Scale one-tenth.)
— 6. A plan of the Slide, and part of Scale, half size.
— 7. An elevation of the Slide, ditto.

AGRICULTURAL ENGINEERING.

MODEL MAPPING. BY J. BAILEY DENTON.

THIS is a very unpretending pamphlet, on one of the most important subjects to which any writer can direct his attention. In saying this, we do not so much allude to the model map itself, as to the uses to which it may be applied, and its easy application to those uses, compared with any other mode of delineating an estate, or a larger or smaller district. The mere model, if carried no farther than something just to look at, is only a toy, though a very pretty toy; but when we are acquainted with the uses to which it may be turned, it becomes a general index to every species of improvement of the land which it represents; and therefore it ought to be possessed by every landed proprietor who wishes to increase the value of his lands, and by the corporation or managing body of every city and town, where cleanliness, health, and comfort are rightly attended to.

Model maps are by no means new, for some have been in existence for many years, and among these there is a model of Switzerland, which is considered a very beautiful work of art. Such a model as this, however, though it may be beautiful, does not belong to the most useful class. Scarcely any labour would make such a one quite accurate; and it contains too much useless surface—that is, surface which cannot be cultivated or even inhabited—for being of much practical value as a whole. These objections apply, more or less, to every mountainous country, and in proportion as the relief of the mountains is more bold and striking, the general model is of less value. Take, for instance, the Grampians in Scotland, or still more, the rugged and detached mountains which lie to the north of the great sectional valley extending from Inverness to Fort William, and though the model of either of them would be obtained at enormous labour and expense, it would be available for useful purposes in only detached sections, which would embrace but a fraction of the surface. Models of very large extents of country are liable to the same objections as general maps; they are on too large a scale for admitting of the representation of any of those works which affect the surface in the quantity or quality of its produce; for though they may serve well for expressing the great natural and artificial features of the country, they cannot be made fairly and faithfully to show those minor features upon which the real character of the country depends.

This last object can be obtained only by such models as those proposed by Mr. Denton; and, considering their many uses, the estimate which he gives of them is a mere trifle,—which, for the average of estates in England, he says, would be only from 2*s.* 6*d.* to 3*s.* 6*d.* an acre; in which, however, we presume he does not include the original horizontal survey and map on a plane surface, which of course is the foundation of the whole. As to the scale, six chains to the inch is recommended for general representation, four chains to the inch for drainage and other improvements, and one chain or half a chain to the inch for cities and towns. 80 chains are a mile; and as the Ordnance map, as at present engraved, is one mile to the inch, the plans for general purposes would be 80 times as much in line, and 6400 in surface, as the Ordnance map, which would give room for very considerable minuteness of detail.

In countries, such as the greater part of England, where the inequalities of surface are trifling, as compared with the horizontal distances, it is usual to make the vertical sections on scales considerably larger than those of the plans: these, however, are inconvenient for popular use, even in the case of a ground plan and section, because some effort or some previous knowledge of maps is necessary in order fully to understand the adaptation of one to the other. For models, it is desirable that the horizontal and vertical scale should be the same, because then, if the details are properly made out, the model will be a perfect miniature of the ground.

In order to obtain the data for the model, two operations are necessary: First, the obtaining of as accurate a measurement and plan of the horizontal surface as can possibly be obtained; and secondly, the finding of the requisite number of levels or elevations above the horizontal surface. Corresponding with these, Mr. Denton makes two sections,—"Survey of the Area," and "Levelling."

SURVEY OF THE AREA.—This is what is obtained by every common land-surveyor, or rather land-measurer; and our author recommends as ground-works, the various surveys that have been made for the Commutation of Tithes, the New Poor Law, and other purposes ordered by parliament, and executed under the superintendence of commissioners; but from the manner in which very many of those surveys have been made, we should doubt whether they are accurate enough. For general purposes, the Ordnance maps are better as to mere surface; but even these would require to be verified, to see whether the details are properly adjusted to the great lines of triangulation; and as the ordnance maps have no *terriere* or system of elevations marked upon them, they are of no use in obtaining the vertical data. If the model is to be at all perfect, a new survey should in every case be taken by skilful and practised surveyors, possessed of the very best instruments. The basis of this, if the estate or other ground is of any extent, should be a triangulation. Now, as every triangle on the surface of the earth, when reduced to the mean level of the surface, is not a plane triangle, but nearly a spherical one, formed by the intersection of the planes of three great circles at the earth's mean centre, there is always a spherical excess to be allowed. The angles formed by the arcs of circumference of the three circles which are the horizontal lines, are always greater than two right angles, and thus the principles of straight-lined triangles do not apply accurately to them. If all the three planes are brought together so that they intersect each other in a point, then the triangle vanishes. If, on the other hand, they are opened out from each other, the three angles, and consequently the spherical excess, get greater and greater, till the opening is so continued as that all the great circles are in the same plane; and there the triangle becomes the surface of a hemisphere, or in other words, it vanishes, and at the instant of vanishing the three angles are equal to six right angles.

From this general relation, it follows that, if the triangle is very small, the spherical excess cannot be estimated; but still it must be understood, because, as the extent increases, so does the error.

If modelling is the object, different lines from those of triangulation for the mere area will often be required; and the position of these will depend upon the inequalities of the surface. They should be carried from the lowest points to the highest; and the more there are of them, the greater accuracy can be given to the model. Before putting in those lines, it is desirable that the area should be plotted with the greatest possible accuracy, reducing it at the same time to the mean level of the lowest ground. The way

of doing this, is to shorten all the oblique or sloping lines, whether calculated from triangles or measured by the chain, and the proportion is, as radius to co-sine angle of depression, so is sloping line to horizontal line.

When this part of the work is accurately done, it may be plotted on paper, or better still on the board or other surface secured against warping or expansion by different states of the atmosphere, which is to serve as the base or ground-work of the model, and this being done, all is prepared for the reception of the levels.

LEVELLING.—Though this is field labour, as well as the finding of the area, they are better not done together, unless there are many hands at the work; and even then, one party takes the one operation, and the other the other. The surest way of doing things well, and, generally speaking, in the most expeditious way, is to do only one thing at a time; and more blunders are produced by confusion of operations, than by any other cause. The lines for levelling are to be marked or picketed out, so as to mark the points where the surface varies; and, when this is done, the levels may be taken either with the common level and staves, or the theodolite; but, whether the one or the other of these instruments is used, the level should be reversed, because the mean of the elevation and depression, taken at the two extremities of any line, is the true obliquity of any line. If the differences of elevation are small, the level, if a good one, and both it and the staves are skilfully managed, will do well enough; but if the inequalities are great, and pretty long sights can be obtained, the theodolite is better for the entire slopes, though the minor details may in most instances be filled in with the level. When as many points as the surveyor thinks will give him the true surface have been ascertained, they ought to be reduced to their horizontal distances, so that each may be placed directly over the corresponding point in the ground plan. The height of each of these points above the lowest part of the ground is then to be taken, and the same scale in altitude as in plan, gives the true form; though the relief is more bold, and the relative proportions bear the same ratio when the scale of elevation is larger.

MODELLING.—When all the points are made out, and marked on the flat surface—and it should be perfectly true—which is to be the base of the model, then small wires of copper or zinc are recommended for getting out the points on the surface. These are inserted in the base, so as to stand at right angles to its surface, and they must be cut by a scale exactly to the heights. If they are many, it is not desirable to insert them all before the modelling is begun, because they are apt to be bent, and therefore the model may proceed by sections. It is an easy matter; and for making it, Mr. Denton recommends the same composition as is used by carvers and gilders for moulded ornaments. It is first brought up to, but not over, the tops of all the small wires at the points, and this gives the general surface, upon which the minutiæ are worked with modelling tools. In order to get these details, it is desirable to have a correct written description of the surface, because that will save several journeys to the ground, which otherwise would be necessary in an extensive and varied model. When, by these means, the shape of the surface is represented as accurately as possible, the characters are to be given to it. This is done by first painting the model white, then tracing the plan upon it, but using the sloping, not the horizontal lines. This being done, the characters of the different surfaces are to be given by means of colours, and if these colours are made to represent the differences of soil, as well as of appearance, the model will be all the more valuable. After all the characters of the surface have been put in, the woods, buildings, and other objects in relief are to be added, forming them of substances which shall adhere to the model, and tinting them of their proper colours. Every feature and character being thus made out with the greatest possible accuracy, the surface of the model should be varnished, in order to preserve it, and it will at all times be fit for use.

Mr. D. gives sketches of two instruments for taking differences of distance and altitude on the model after it is made; one of these is a sort of beam compass, having a spirit level let into the beam, a fixed foot at one end, and another foot, which can be moved both in distance and altitude by means of rack-work. The upper side of the beam is graduated to show distances, and the moveable foot to show altitudes. In using it, the fixed foot is placed on the higher point, and the moveable foot on the lower; then the beam is adjusted to a perfect level by the rack-work, and the distance and difference of elevation are very easily read off. The other instrument is a sort of pair of compasses, with a graduated arc of considerable extent, and a plummet suspended from the centre of the joint. In using it, the points of the compasses are applied to the points of surface to be examined. If the plumb-line crosses the middle of the intercepted part of the arc, the two points are on a level; if not, the plumb-line hangs nearer the lower one; and the sine of the angle between the plumb-line and centre of the arc is the altitude of the higher point, the distance of the points being the radius, and its length found by applying the points to the scale of the model. By means of these very simple instruments, of which the first is the best, though most complicated, the same mensuration may be performed on the model, which the measuring and levelling gives on the ground itself:—or the general slope and course of drainage may be observed, by pouring water on the model with the base perfectly horizontal.

In the first part of his pamphlet, Mr. Denton points out the improvements that can be made on an estate, from the study of such a model. Among these, the leading ones are drainage and irrigation, the two grand means of improving the fertility of the soil and the healthfulness of the atmosphere over it. It is quite evident, that, in order to the proper accomplishment of these objects, the model, or the book of explanations accompanying the model, should show the nature both of the soil and of the subsoil, as these have often very different characters, and while in many places, boring into the subsoil procures water for irrigation, or for any other surface purpose, there are other cases in which boring serves as a drainage, especially on a small scale. We remember an instance where the surface soil of a field was decomposed greenstone, together with the usual contents of fertile ground, while the bottom was loose gravel, extending to a considerable depth. This field had a natural drainage by slopes, except in a deep depression, to which all the rest declined, and which had no surface drainage. In course of time, the rains had washed, and the winds blown, a quantity of the disintegrated clay and other fine matters into this depression, and these had converted a portion of the centre of it, which had been only an occasional pool during rains so long as the whole remained in pasture, into a permanent one, with marshy sides, after the ground had been some time under culture. This marshy pool was gradually extending in surface every year, and tainting the atmosphere, and injuring the crops, in all the lower parts of the field. To drain it in the usual way was not an easy matter, as it would have required pretty long and very deep cutting,

and the gravelly soil could not be tunnelled. A gentleman, who was not a professional surveyor and engineer, but a mill-wright, recommended boring; and when that was done, the water speedily sunk into the gravel. After this, he recommended a circular pit to be made down to the gravel, which was only a few feet, and filled with furze, to be removed as occasion required, and this having been done, the water showed no tendency to accumulate and stagnate.

This is one instance of very simple drainage, obtained at not more than one-hundredth part of the usual expense; and, if proprietors, surveyors, and all others concerned in the productive, healthy, and ornamental condition of the soil—and who is not so interested?—would make themselves acquainted with the nature of their localities, there is no question that a body of knowledge could speedily be collected, the application of which would greatly facilitate and lessen the cost of the improvement of land.

The increase of the produce of the land is unquestionably the most important subject to which the attention either of statesmen or of others can be directed. The ratio of agricultural produce, and of domesticated animals, is better adjusted in Britain than in any country that can be named, in consequence of the greater numbers of the latter, and the tendency which they have to improve and strengthen the land; whereas, continual cropping without the renovation of manures always wears it out, and would ultimately convert it into peat-bog, or desert. But, notwithstanding this, and notwithstanding the improvement which has taken place in local modes of culture, in the implements of farming, and in the breeds of stock, there has not yet been introduced any general system of improvement. We hope, however, that such a system will speedily be introduced, the more especially that it was alluded to by so energetic a nobleman as Lord Stanley, before the Royal Agricultural Meeting at Liverpool, on the 22nd of July. "The man," said Lord Stanley, "would be thought to have conferred no trifling benefit to this country, who should add one bushel (per acre we presume he means,) to the wheat produced by the wildest lands of England; yet I am confident that I speak within compass, when I say there are hundreds of thousands of acres which are capable, by improved cultivation, and attention to drainage, of producing five, ten, or fifteen bushels per acre more than they do." We think that, if due attention were paid, Lord Stanley did not over-rate the productive capability of English land, nor do we think that it would be an over-statement to allow eight bushels, or one quarter of wheat, for the average increase on the whole wheat land, if systematically and thoroughly improved. Statistical writers estimate this wheat land at nearly 4,000,000 acres, for England and Wales; and, as a thorough system of improvement might bring under wheat a considerable breadth of land, which is at present absolutely waste and wild, this would add 4,000,000 quarters, or more than twenty-five per cent. to the home produce, and thus render the country perfectly independent of foreign nations in the article of bread corn, thereby taking off all inducements to those legislative restrictions upon this article, which have been, and are, injurious to the country, though more so in name than in reality. Even those who show the greatest disposition to exaggerate this matter, do not estimate the obtainable foreign supply at so much as would suffice for four weeks, whereas, in the proper improvement of our own country, there is involved an increase which would serve for more than ten weeks. This, too, without any lessening of the breadth of land sown or planted with other crops, or laid down in pasture, but with some advantage to the whole, as there is reciprocation in all the branches of agriculture, and still more especially as the lands adapted to other purposes are susceptible of as much relative improvement as those sown in wheat. In our intercourse with foreigners, our coal and our iron, with the great facilities of transport both by land and water which we possess, are our leading advantages, and they are advantages of which, except by our own bad management, we can never be deprived. We ought to bear in mind, however, that our own markets are the real support of our population, and the grand means of all improvements and prosperity. The agriculturists, from the most wealthy proprietor to the humblest cottager, are the best customers of our manufacturers and merchants; and, on the other hand, the manufacturers and merchants, from the greatest capitalist down to the humblest workman, are the best customers of our agriculturists. Of the truth of this, every unprejudiced man must be more strongly convinced in proportion as he more attentively studies the subject; and, therefore, this truth should be warmly inculcated as one of the best bands of our social union.

Unfortunately, this has not at all times been the case, for there have not been wanting those who have made it their study and their practice to excite the manufacturing and mercantile interest against the agricultural, or the agricultural against that. Each of these septs has endeavoured to persuade its dupes that the other party are their real enemies, instead of being, as they are in reality, co-operators with them for the one general good of the whole country. That there are men hostile to, or enemies of each other, we do not mean to deny; but we suspect they will be found more frequently in the same profession, than in those of an opposite character; and it would not be more absurd to say, that, because one leg of a man is right, and the other left, they hinder each other in walking or running, than to say that the two grand divisions of society have natural hostility or opposite interests.

There are some circumstances, however, which tend to attract the public attention, and the attention of all departments of society not calm in thought, more to manufactures and commerce than to agriculture.

In the present state of the country, it is sincerely to be desired that agitators of all denominations should "cease from troubling," and look upon the entire nation as one society, wherein there should be no rivalship, except an effort on the part of each to do his duty in the best manner, and be of the greatest service to himself and to others. For the accomplishment of this, we must, putting aside all party politics, which are not our vocation, and for which we care not a straw, express our firm belief, that there never was a time more favourable than the present. Fifteen years of physical warfare appear to have saturated all the nations of Europe pretty well with that commodity; and, although the metaphysical war of parties is not of so mortal a character as the other, yet we would willingly believe that five-and-twenty years campaigning at it ought to be a measure which should satisfy all, save those whose consciences have extended so much in size, that the gripe which they take of the feelings has been reduced to almost nothing. For this reason, we think Mr. Denton's pamphlet is well timed, and that, though it goes directly only to one grand subject, it may be useful to various other subordinate ones. Mr. D. raises only a few points, but they are points of very great importance, and we hope that they will be generally taken up, and become a parliamentary subject. We have had railway parliaments and joint-stock parliaments of all kinds, *ad nauseam*, and now it is high time we had a general land im-

provement parliament to some purpose. As Mr. Denton has suggested something novel, if not absolutely new, for the land-owners to look at, we sincerely trust that it will give them a new turn for thought.

PHANTASMATA,

OR

SCENES IN THE SHADES.

SCENE I.

James Wyatt, and *Sir John Soane*.

WYATT. So, Sir John! You are arrived among us at last. I began to fancy that the weight of your gold medal—you find I've heard of that mightily grand affair—had sunk you to the bottom of the Styx.

SOANE. Prithee, James, don't mention that humbugging business, unless you wish to see me fairly jump into the Styx, and stick fast in its mud, out of sheer vexation. A pack of fawning, canting, scurvy rogues, to pretend so much affection, veneration, and regard; and after all, to leave me completely in the lurch when I most needed their good word!

WYATT. I do not comprehend you. What is it that thus stirs up your gall, and disturbs your placidity?

SOANE. Gall, indeed!—Yes, I am boiling over with rage, if you mean that. Why, you must know that, although the creatures I speak of professed so much personal esteem for me, and such very high admiration of my professional talents, not one of them even so much as offered to take to task that scurvy papistical varlet, Welby Pugin, for calling my taste in question, showing up the "Professor's Own House"—as he sneeringly termed it,—*in terrorem*, making a scarecrow of it, and flouting the taste displayed in it. Nay, they have even suffered another confounded critical puppy to liken the front of "The House and Museum on the north side of Lincoln's Inn Fields" to that of a London Gin Palace, merely because its striking and peregrine design has caused it to be taken as a classical model for edifices of the last-mentioned kind, by those who striving to imitate it only *cocknefy* it, just as they would cocknefy the Parthenon!

WYATT. Stop, stop, Sir John; you run on so fast that you really quite bewilder me. Before you proceed further, pray give me leave to ask, who is that same Welby Pugin who has so outraged your feelings?

SOANE. What! have you not heard of him and his precious book? Come, that is very good, faith! Then I shall at least have the satisfaction of being the first to inform you in what exceedingly handsome terms he has spoken of yourself in his "Contrasts."

WYATT. Too complimentary, no doubt. 'Tis true I did some decent things in my time, which the world was good-natured enough to extol, and this Mr. *Well-bred* Pugin, or whatever his name may be, has, perhaps, extolled them rather beyond their merits, for the purpose of depreciating, by comparison with them, the works of some of his contemporaries; and has thereby given umbrage to a good many worthy people. Those who deal in criticism ought to be more considerate, and not be so unfair towards persons of mere average talent as to contrast them with first-rate geniusses.

SOANE. (*Aside.*) What insufferable vanity and conceit! but I have a dose that will purge him of it.—You are not altogether wide of the mark: it certainly has been his object to depreciate his contemporaries and their works, and to show how deplorable is the actual state of the art compared with what it once was.

WYATT. A task requiring no little delicacy and discretion. So, by quoting my buildings as examples very far superior to any thing since produced, he has, I presume, allowed his taste to get the better of his prudence, expressing himself too warmly in my praise;—for *entre nous*, Sir John, we architects are given to be a *leetle* jealous of each other.

SOANE. I assure you, James, very few will henceforth be jealous of you, or envy you the reputation you have got from your friend *Well-bred*, as you call him. You outshine all others indeed! Why! the *shine* is all taken out of you.

WYATT. You begin to talk so incoherently, Sir John, that I am afraid the gold-medal affair has quite turned your head; and that, had you lived a little longer, your friends would have been compelled to appoint a commission to inquire whether you were not of unsound mind.

SOANE. (*Aside.*) Malicious fellow! I dare say he has heard of the fuss that has been made about my will, and the doubts that have been started as to my sanity when I made it. However, I have revenge in store.—No, James, 'tis not as you seem to apprehend The fear is, whether you will be able to retain your own senses when I inform you that Pugin describes you in his book, by the style of "James Wyatt of EXECRABLE MEMORY."

WYATT. Oh the wretch! the papist! the puppy! But you must be jesting, Sir John; aye, now I see plainly enough, by the very unusual smile upon your face, that you are now only trying to hoax me.

SOANE. If I smile, it is at your incredulity—(*aside*) and mortification.—I assure you that I am not hoaxing now, though I plead guilty to having just played off a hoax on a grand scale, and upon no less a personage than that very enlightened gentleman John Bull himself, munificently making him a *donation* of my house and museum, but on such ingenious conditions that John may hardly ever thrust his nose into it: ha, ha, ha! I fairly diddled Bull—or Gull, there! and that too by Act of Parliament, and got very great credit for munificence by so doing.

WYATT. For *moon*ificence—mere moonshine, you mean.—But come, leave your own capital doings for awhile, and tell me seriously whether I, the *crack* architect of my day, have been spoken of so contemptuously by the pug-dog scribbler you mention.

SOANE. In all seriousness, then, such is the fact; you are therefore more crack now than ever, since he has fairly cracked your reputation. You look as if you did not care to believe me; and perhaps you will hardly credit that, among other compliments, he associates you with Miss Betty, *alias* Batty Langley.

WYATT. Impossible!—unless, indeed, he be some poor lunatic, some bedlamite who sets himself up for an architectural critic.

SOANE. Be he whatever he may, himself, his libellous book qualified nearly all the profession for Bedlam, by galling them to madness.

WYATT. Then, if so, he has, of course, been finely taken to task in return, both by reviewers and by the profession themselves.

SOANE. Hang them! no. The reviewers are such numscults, that some of them even complimented him on his wonderful zeal in

behalf of Gothic architecture, without reprimanding him for his insolence towards myself and other modern luminaries of the art.

WYATT. But had he all the critics on his side? Was there not one who contradicted any of his opinions?

SOANE. Yes; one or two there were, who did not spare *him*; but then, they made matters worse, by completely knocking down *me*; at least, one did, who quizzed my house and my own description of it, without mercy.

WYATT. And the profession? did not they, to a man, make common cause with you, against both Pugin and reviewers?

SOANE. The pluckless varlets! not they indeed! They left me again completely in the lurch, just as they did in that stupid "Bœotian" affair,*—(*aside*) where I made a complete fool of myself.

WYATT. Well, but what need you care for snipper-snapper reviewers?—blundering ignoramusses, who understand nothing whatever of architecture, and who are listened to only by those still more ignorant than themselves.

SOANE. Yes, there are complete ignoramusses among them, I allow; yet there are also a few others who fairly nonplus us "regulars."

WYATT. Ha! I understand—"march of intellect" age! Well, things must have taken a queer turn since my time.

SOANE. You may well say that, James. Critics, that is, those of any pretension, do not now go into extacies, as they did formerly, at a tolerably decent design; but, on the contrary, analyse and anatomize a building *sans ceremonie*. No, your halcyon *Pantheon* days are now quite gone by, and the once so much cried-up "taste" and "purity" of James Wyatt would now hardly pass muster of a gin-shop.

WYATT. I suspect, Sir John, you must have been in some such place just before you came hither, and are not yet quite sober.

SOANE. No, James, if I swallowed any gin at all, it was that confounded dose of *Poo-gin* I've told you of, and which certainly made me quite sick, nor am I recovered from it, even yet. Only conceive the fellow's effrontery!—to put the professor's own house alongside a vile, old, tumble-down, crazy tenement at Rouen! And not content with that piece of impertinence, he went so far as to speak of the "Board of Trade" as one of the buildings that are a "national disgrace." I wonder he spared even the front of the "Redemption Office," or that singularly tasteful piece of architecture erected by me in Portugal Street: but, no! he could not detect a single fault in them; and, therefore, lest he should appear too liberal, passed them over in silence.

WYATT. (*Aside.*) Enviable self-conceit!—But are you quite sure, after all, Sir John, that it is me who is gibbetted in the opprobrious terms you mention.

SOANE. Quite sure,—no mistake, I assure you; for he expressly says "*James* Wyatt, of execrable memory;" and mentions your doings at Salisbury cathedral, as deserving only vituperation.

WYATT. The monster! the Goth.

SOANE. Yes: Goth enough; a Gothic-mad Goth; a præter-pluperfect Goth, as the Quarterly Review styled him.

WYATT. I am glad to hear, however, that the pedantic puppy has been ridiculed; and trust there will yet be found those who will rise up and avenge us.

* The affair here alluded to was an article entitled "The Bœotian style of Architecture," in which Sir J. Soane's architectural fancies were very freely quizzed; in which account he thought proper, a year or two afterwards, when the periodical to appeared in had been discontinued, to bring his action for libel against the publisher, thereby showing himself to be a veritable Bœotian.

SOANE. Not unless we can rise up ourselves in our own defence. For my part, I am morally certain that, if no one cared to avenge me while I was in the world, and one of its living lions, no one will take up his literary cudgel in my behalf, now that I have become a dead one. No, all left me in the lurch, even my little valiant champion of an F.S.A. Nay, even more, he has refused me, his "much esteemed friend," a niche in his Dictionary, though he could find room there for a pack of raggamuffin mechanics, stone-masons, carpenters, glaziers,—fellows not to be thrust into the company of architects at all.

WYATT. I protest I feel quite ashamed at being at all mixed up with such low people.

SOANE. Oh! make yourself perfectly easy on that head, for he has left out you also.

WYATT. Why then, confound him for a blundering book-maker, who does not know his own trade. Methinks the world must have been turned quite topsy-turvy since I quitted it; and architecture, I suppose, has been reformed pretty much after the fashion some other things have.

SOANE. Yes; just before I set out hither, a terrible fuss was making about *Polychromy*, some wiseacres having discovered that we had been all along mistaken with regard to the taste of the Greeks in architecture, and insisting that it was their practice to plaster their marble columns and entablatures, and then paint them of various colours.

WYATT. Fie upon it! Why that's making architecture then a painted Jezabel: 'tis literally the "harlotry of art."

SOANE. Don't talk of painted Jezabels; I know to my great mortification what it is to be painted. It was my ill luck to be painted by M'Clise, who made me look like an old male Jezabel myself. I would rather encounter a savage Pict, than such another picture of my own person. (*Aside.*) Provokingly like, though, for all that!

WYATT. I must say, Sir John, that you bring very uncomfortable news with you.

SOANE. Yes, you have reason to say that; but it is one consolation for me that I took my revenge upon the world before I said good-bye to it: ha! ha! ha! I cannot help chuckling when I think of it.

WYATT. And pray, how have you revenged yourself upon the world?

SOANE. Why, by playing off a most magnificent hoax upon it. After having astonished it by an act of unparalleled public spirit, patriotism, liberality, generosity, and by an act of Parliament to boot, I "nobly" bequeathed and gave my "House and Museum in Lincoln's Inn Fields," to the public: after being extolled to the skies for my unbounded munificence; after having feasted upon, I may say gorged myself, with the fat and fulsome flatteries of the newspapers, I very coolly clapped a padlock upon my Museum, ordering, by special conditions, which I was at liberty to make, that it should be open only a few hours on about a score of days of the three hundred and sixty-five in the year, and then only by tickets; so that, after all, it is no more John Bull's property, nor even so much, as any of the "show houses" in the kingdom. Now, was not that a master-stroke—an unheard-of piece of refinement in the art of hoaxing?

WYATT. Indeed it was; and you have at all events taken care that your house in Lincoln's Inn Fields shall never be called a *public-house*.

SOANE. You allow, then, that I managed that cleverly?

WYATT. Very cleverly, no doubt; for people will say, that while you were a professor of architecture, and made a great profession of liberality, what you really practised, was, after all, nothing but downright HUMBUG.

HOLBORN BRIDGE VIADUCT.

WE suppose that, in consequence of the anticipated shortness of the present intervening Session of Parliament, this, and all other schemes and projects requiring the sanction of Acts of the Legislature, will be in abeyance till the commencement of next year. This, however, will give the parties concerned time to review their plans and estimates, and to bring them forward in a less crude and immature state than if they had been more hurried. This we think a matter of considerable importance, as it is this hurry in the bringing forward of schemes for the promotion of public works, which has been the cause of many of the erroneous plans, and blundering estimates, both of which have again and again sent the proprietors to Parliament for amended or additional bills, whereby much expense has been incurred, which would have been saved if the plans and estimates had, in the first instance, been correct.

There is another great advantage in having these proposals before the public for some time ere they go to the legislator; and this is, the probable saving of expensive opposition, on prolonged litigation. If any scheme interferes with the grounds or other properties of individuals, it is scarcely possible that every one of them shall be satisfied, however beneficial the project may really be to them all. Opposition and controversy are so habitual to most people, that they are loved and entered into for their own sakes. Whether this arises from the debates in parliament, in which mere debate so vastly outmeasures real business, and the reports of such debates forming much of the daily reading of the people, we pretend not to decide; but it must be admitted, as a fact, that disputation is part of the character, and apparently, also, of the very constitution of John Bull. In this way a great deal of money as well as time is wasted, in a manner which brings no useful return to the parties or the public, as it merely goes to pay those who have an interest in promoting disputes. If, instead of this, the parties would come fairly, and in a candid and kindly spirit, to mutual explanation, they would in general find out the right without any expense.

We have been led to these remarks by what we have heard of dislike and intended opposition to the Holborn Bridge Viaduct. In a former number we endeavoured to show the necessity of an improvement of this kind—a necessity which one would suppose would be more valued by the inhabitants of the locality than by any other parties whatsoever. They see the daily—in some states of the weather hourly casualties that happen there, to the great destruction of horses, and much peril to human life: seeing these, one would suppose that they would be anxious to prevent them; but such is the nature of men, that they become in time so accustomed to even painful events, that they pass as a matter of course. We do not say that they all feel, or plead the excuse of the fisherwoman, when accused of cruelty in skinning eels alive—that the eels could not feel it much, they were so accustomed to it, for she had been skinning of them every day for nearly forty years; but still there is a wonderful tendency in mankind to be indifferent to scenes of cruelty, if such are witnessed by them frequently and for some time.

The casualties on Holborn Hill seem to have become indifferent to the inhabitants for this very reason, and hence their alleged opposition to the Viaduct. Now, on comparing the various schemes that have been broached for the removal of these casualties, we thought, and endeavoured to show, that the Viaduct is decidedly the best one,—that, if carried into effect, it will at once remove the danger of the road, and not do any material injury, indeed any injury at all, but rather the reverse, to the adjoining property. Besides the high mound, which we showed would spoil the crossing, and render the place quite a nuisance, we have heard the idea mooted of a lower mound, which should only in part remove the danger of the street. But, besides its imperfection, this is open to all the objections which apply to the taller mound, and it involves an additional one. There might be in the lofty mound an arch, which, though it would injure the north and south thoroughfare, would not completely block it up, or cause the forming of a cross mound. For these reasons we think that the inhabitants ought, during the period of abeyance, carefully to re-consider the scheme of the viaduct, and it is probable that they would see it in another light, and offer no objection to it. It might, perhaps, also be as well for the engineer and the architect to re-consider their plan, and see whether they could not get rid of that widening of Snow Hill, which, on account of the value of the buildings, would be the most expensive part of the whole, and the one respecting which the greatest opposition would probably be made. As no part of the viaduct there would be of any considerable height, the side-roads might bear to be a little narrower than in the more dangerous part; but the widening of Holborn Hill is indispensable, and would be in itself a great improvement, though no viaduct were to be constructed.

We have heard of some other grounds of objection; but they are of a more personal nature, would be likely to die away of their own accord, and might be fomented and prolonged by public notice.

ON SEWERAGE.

SIR,

THE great interest manifested by your Journal upon the subject of the sewerage of London, gives me an excuse for troubling you with a proposition of mine, relative to the sewerage and drainage of towns and villages, under the bill introduced into Parliament by the Marquis of Normanby. By many, I have little doubt, my scheme for modelling estates on accurate scales, with a view to general and economic drainage, will be disregarded, because its expense is rather more than that of ordinary maps, but I do not deem it likely that the same objection will outweigh the evident advantage to be obtained from a consideration of the contour of any district intended to be drained in execution of this new measure.

I suggest, that the district of ground upon which the town is situate should be surveyed, levelled, and modelled in relief, to accurate horizontal and vertical scales; and that the survey and model map thereof be made to extend so far beyond the limits of the town, as to include the watercourses, rivers, or other outlets (whatever they may be), into which the whole is to be drained. The model-map,

(unless preferred by the corporation or town authorities) need not shew, in *super* relief, the buildings composing the town, but merely the undulations of the surface, and the boundary of each property, the streets being *blocked* with characteristic elevations. On the face of the map would be shewn the line of sewerage for each distinct property.

I would farther suggest, that the model-map be deposited in the public office of the surveyor appointed under the act, for the inspection of the public.

With this simple guide for effectual drainage, a systematic method might be carried out, and all parties would be enabled to trace the reason and operation of the surveyor's directions.

As you have very truly and earnestly expressed, the landowners of this country have yet to know the advantage and economy of a proper application of the refuse waters of the higher lands. I am humbly of opinion, that, were the interest and energy of the agriculturist awakened by a knowledge of the surface outline of his estate, (and I know of no better means of doing this than by a documental work of art, embodying the advantages of an ordinary map, in a complete miniature of his property,) the co-operation of the engineer would be required to carry out, scientifically, operations which would then be made evident, but which are too frequently dismissed from the mind in dread of unknown expense.

I am, Sir,

Your obedient servant,

J. Bailey Denton.

9 Gray's Inn Square,
10th September, 1841.

THE "LIGHT OF ALL NATIONS."

A proposal for the erection of a structure, to which this name has been applied, and which it is proposed to erect on the Goodwin Sands, as a fixed lighthouse, for the safety of vessels navigating the dangerous channels adjoining that bank, has been a considerable time before the public, and has pretty strongly drawn the attention of the credulous, especially in the east part of Kent. It has also gone the round of the newspapers, from "The Times" downwards, and has been puffed with the power of a thousand blast furnaces by that paper, and by some others, but by none so loudly as by the said "Times." The credulous part of the public, like clowns in a city, have always their mouths gaping open to swallow any bait that may present itself; and therefore they are not to be blamed for swallowing such a subject as this. The newspapers, again, in their ordinary vocation of politics, whatever side they may take, are, for the most part, so prone to distort and exaggerate, that it is scarcely possible for them to make clear and faithful statements and explanations of matters which they do understand. But, in addition to this, the writers of newspapers, whatever talent they may have in their own way, cannot by possibility understand much of engineering. We never heard of an instance in which an engineer became a newspaper writer, after he had thoroughly studied the science and practice of the profession; and we do not believe it practicable or even possible for any man, however talented, to study and practise engineering, after he has entered upon his vocation of politics, and passing events and occurrences. Consequently, though the newspapers appear to have been all gulled upon this subject, and some of them perhaps sweetened, we are not inclined to think them open to any blame, save what may attach to writing upon a subject of which they are, of necessity, almost or altogether ignorant.

We had always doubts of this project, and had suspicions that it might be a hoax played off by some wag; and a correspondent now informs us, that such was really the case at the outset. We cannot of course verify the truth of what he says, because it does not involve the operative part of the proposal, on the difficulties which there would be in the erecting of the structure, and the chance of its falling endlong when erected. He informs us, that a person in Deal, or its neighbourhood we believe, was anxious to obtain a little money; and that, after other schemes were thought of and abandoned, he had recourse to this one, as likely to excite great interest in the residents of this part of the country, and also in the numerous travellers and visitors by whom it is frequented. Being thus resolved, he had a drawing made and engraved, representing the projected structure; and copies were on sale at all the places of resort, the price being seven shillings and sixpence for each copy, at which price they sold largely, and the projector obtained his immediate object. As we said before, we do not vouch for the truth of this; but if it is true, never was joint-stock company, even in bubble years, raised upon a more questionable foundation.

On a future occasion, if future occasion there be, we shall enter more largely into the particulars. In the mean time we give the dimensions as sent to us, and shall close with a remark or two.

The whole is to be of cast-iron, and is to consist of the following parts: A base; a pedestal, with sweeps or concave outlines; a column standing on the plinth, and supporting a lanthorn. The base is proposed to be a frustum of a cone, thirty feet in diameter at the base, and twenty-four at the top, and thirty feet high on the sloping side. The sweeping pedestal is to be thirty-four feet in height, and thirteen feet in diameter at the narrowest part. The plinth is to be twenty feet square, and four feet in height; the column forty-five feet high, and the lanthorn twenty feet, making in all 133 feet in height. But as it is proposed to sink the conic frustum down to the chalk, the height above the level of the sands has been estimated at about 100 feet. The whole structure is to be hollow, cast in segments; and within it are to be lodged the men who attend to the light and the lanthorn.

It is obvious that the weight of such a structure would be enormous, and the finding of a proper base for it, even on the most compact chalk, would be a very problematical matter. We understand that the cone is proposed to be first placed on the surface of the sand, and then let down by excavating within it. Now, although such an enormous load of cast-iron would, like Falstaff, "have great alacrity in sinking," we fear that, in the attempted excavation within it, old Davy Jones would be a most formidable enemy. It is quite certain that both North Sea and Atlantic would combine in keeping the interior of the cone tide high of water in passing through the gravel; and this is saying, in other words, that the cone could never be let down to the chalk by excavation, without a water-tight coffer-dam; and the construction of one upon the Goodwin Sands, or indeed out at sea anywhere, is a palpable absurdity.

But, supposing all this got over, and the cone let down to the chalk, what chance is there of getting a level foundation for it there? and if it were to be settled obliquely, the structure would be tumbled down by its own weight. But again, supposing the

foundation to be level, and the axis of the cone perpendicular, how would it be made firm in its bed, so as not to be rocked by heavy seas, after the superstructure were placed upon it? Lighthouses, of all buildings, require the surest foundations; and the lower parts of them have to be treenailed, joggled, dovetailed, or bolted to the foundation, in the best and strongest manner. But chalk is a substance of which none of these operations could take firm hold, and therefore the base of the cone could not be made steady, and the slightest vibration in it would make the fabric tumble.

But besides these difficulties, we may say impossibilities, of letting down and fixing the base, the outline of the superstructure, according to the sketch now before us, is the most absurd that can well be imagined for an erection that has to stand in the sea. Somewhere about the middle the pedestal narrrows to thirteen feet, and then it expands again and ends in a plinth of twenty feet square. Above this there is the forty-five feet of column, and the twenty feet of lanthorn, so that, supposing the thing to be erected, it would be one of the queerest objects which one could imagine; and we are inclined to think that it would not stand against the wind, and far less against the wind and the sea united together. Were it to fall bodily, the splash would astonish the fishes as far as the Dogger Bank; but they may continue eating one another in security, for it is impracticable. So much for the "Light of all Nations."

SHORT NOTES.

THERE are three subjects before us, to which we can pay no more attention in this number than a mere notice of each, but that may draw attention to them; and thus we may obtain more information than we now possess, at least, on some of them.

THAMES NAVIGATION IMPROVEMENT.

We understand that a survey of the river above bridge has been partially made by a naval officer, accompanied by Mr. President Walker, who will likely be the engineer, and probably also the contractor, if any thing is to be done. If it has not been done already, the survey should be extended, at least as far as Teddingdon Lock, even in the first instance; for if this is not done, what is considered an improvement, and even actually is so, in one part, may be as much the reverse in another. Generally speaking, the best improvement would be, narrowing the wider parts of the channel, deepening the shallows, getting rid of the eddies which cause depositions of silt, and improving, elevating, and ornamenting the banks, which, in many parts, and especially where the towing path is, are, in their present state, quite abominable. Then steam tugs should be substituted for the present horse-power, which would expedite the transport, make it independent of the tides, and secure the barges from grounding or swamping. In addition to this, Kew bridge, and all the bridges below it, should be made public property; and the ugly and unengineer-like wooden ones at Putney and Battersea should be removed altogether, and suspension bridges, clear from bank to bank, erected in their stead. These bridges occasion more accidents, and greater loss of life, than any thing else connected with this part of the Thames: though they may be good properties to the owners, they are maintained at a vast and almost yearly expense for repairs, and the pontage levied at them is a pest to the public. Besides this, admitting that the proprietors can afford to pay for the constant repairs, and still have a handsome profit, that only shows that the public pay for these ugly and dangerous things far more than they ought to pay; and the purchase of the present bridges, and the erection of the suspension ones, would be a mere bagatelle in the national expense. We shall return to this subject when the surveyors shall have made their report, and the parties having control shall have done their incubation, so as to bring something out of it.

THAMES SUSPENSION ROADWAY.

We have received a communication much too late and too long for being inserted in our present number, comparative of the projected suspension roadway, and the project of Colonel Trench, and critical upon them both. We have not yet got possession of all the data for estimating the exact cost for the roadway, and we desiderate some explanation from Colonel Trench, without which a perfectly accurate judgment of his project cannot be formed: therefore we must wait, but we do so with a little impatience, especially in so far as Sir Frederic Trench is concerned.

INTERLOPING PROJECTORS.

We have received what purports to be "Subjects for a draught of a Bill, which should be brought into Parliament, and enacted into a law, for preventing any discovery from being made from the wrong party." Our correspondent complains that tailors, whose swiftest locomotive should be a needle, and their hottest and heaviest engine a goose, have taken out patents for improvements on railways and their trains, which are quite foreign to the craft and mystery of breeches-making. Again, he complains that brewers have not only projected, but actually made bridges, and that at a vast saving to the public, to the shame and loss of legitimate bridge-builders; whereas, a brewer has no right to know anything about curves, except it be the parabola in which beer spouts from a cask when the spigot is drawn. We cannot at present enumerate any more instances; but the complaint is general, applying to all things and all men; and that inventions are so greedily snapped by interlopers that scarcely any one is left to those with whom they should all, in justice, and therefore in law, emanate. The subject is curious, if not important, and therefore we will revert to it in our next number.

THE CLYDE.

MR. BALD'S REPORT ON ITS IMPROVEMENT.

[WE have been favoured with a copy of the following report by Mr. William Bald, F.R.S.E., &c., the talented engineer of the Clyde navigation; and we hope to receive from the same quarter frequent and regular accounts of the improvements of that river, which is the Mersey of Scotland, in like manner as the city of Glasgow is the Liverpool. We consider every thing connected with an improved navigation of the Clyde as being highly beneficial to the grand commercial interests of Scotland, and therefore we shall keep it constantly in view. Our first intention was to abridge this report, but finding it so pat to its purpose, so well written, and bearing so much on the improvement of other rivers, which, like the Clyde, bring down much debris, and receive the sewerage of populous cities and towns, we give it entire as a document of no common value. This we do the more readily, that the estuaries and outfalls of the great rivers in Britain imperiously demand the examination of scientific men, and the attention of the legislature. They have been much, we had almost said shamefully, neglected.]

"The removal of the weir at the Broomielaw Bridge, and the deepening and clearing of the space upwards to Stockwell Bridge, containing nearly 14 acres, would give much additional tidal water; thereby increasing the currents not only through the harbour, but also to some extent in every part of the Clyde downwards; thus aiding and assisting that scouring force which acts so powerfully in freeing and keeping clear all river estuary channels from banks and shoals—the great obstacle to navigation. In the improvement of the navigation of tidal rivers, no expense or pains should be spared to increase this scouring force, arising from that uniform and constant tidal flow and run of currents, ascending and descending alternately, and which are so eminently distinguished by their beneficial effects in preserving navigable channels, as compared with those violent land-floods, which, in many instances, so frequently carry down immense masses of matter, forming shoals, banks, and bars in them, extremely injurious to the navigation, and involving great expense in keeping them clear.

The removal of the weir at the Broomielaw Bridge, and the additional receptacle for tidal water between the bridges, would have a tendency to sweep and scour away all those impurities which are at present discharged into it by the city sewers. The removal of the weir, and the deepening and clearing away of the channel of the river, would also have the effect of lessening the miasma which arises from the present condition of the bed of the Clyde between the bridges, and would render the atmosphere of that part of the city much more pure and healthy.

It is noble and praiseworthy to erect hospitals and asylums for the relief of those who may unfortunately be afflicted with fever; but how much more advantageous would it be to cut off and destroy the sources from which that contagion arises, by the removal of all offensive matter? In this respect, the attention paid by the Dutch to many of their cities and towns, offers an excellent example to the people of other countries.

At present, the harbour of Glasgow is a receptacle, not only for a large portion of the debris which the Clyde sends down during the floods, but it is also a reservoir for almost the whole of the matter discharged by the city sewerage. The quantity delivered into the present harbour from those two sources is immense.

The flood of last August left a deposit on the steps of the upper ferry-stairs, on the south side of the harbour, as follows:—On the upper step, reached by the flood, a depth of 2 inches; on the descending steps, 2½, 2⅔, 2¾, 3½, 4¾, and 5 inches. The last step was about 3 feet 4 inches below ordinary high-water line. It has been alleged that the river Clyde leaves little or no deposit; but the above facts prove the fallacy of such a statement. Besides, no experienced observer could have a doubt on this subject, who has seen the extremely discoloured state of the water of the Clyde during a flood, by the quantity of alluvium held in suspension, and which is deposited in the bed and sides of the Clyde, wherever the tranquillity of the water is not disturbed by a current sufficient to carry it away; and it should always be recollected, that, in the improvement of the navigation of a river, and the widening of a harbour through which it runs, a velocity of 3inches per second at bottom will work on fine clay; that 6 inches per second will lift fine sand; 8 inches per second, sand as coarse as lintseed; 12 inches per second will sweep along fine gravel; 24 inches per second, gravel one inch in diameter. These established facts ought to govern the engineer as to the width which should be given to rivers, and to harbours through which rivers flow, so as to regulate the velocity of the water and prevent them from being silted up with alluvial matter, or involve a serious expenditure in keeping them clear by the artificial means of steam-dredging; therefore, no exertion or expense should be spared to increase the natural force of the scouring power, by the descending currents through river harbours and river navigations.

It may be observed, that to keep the harbour of Glasgow clear, and sufficiently deep for vessels sailing out and in, requires at least the power of two steam-dredges constantly working; the annual approximate expense of which is as follows:—

Expense of one dredging-boat, per annum, including repair of wear and tear, interest on capital,	£1368	9	4
Steam-power drawing the punts,	500	0	0
Discharging the material and carrying it away,	1200	0	0
Expense of one dredging-vessel,	£3068	8	4

Then, the annual expense of two steam dredging-vessels will be about £6,136 : 18*s.* 8*d.* The area of the wide part of the harbour between Messrs. Todd & Higginbotham's mill, and the weir at the Broomielaw Bridge, is about twenty-one acres, which requires to be operated on constantly by two steam dredging-vessels: this is nearly equal to the rate of £300 per acre of harbour-surface per annum.

Immediately below the weir, and within the port, spaces have been cleared and deepened to 10 feet below low-water line, but which have been filled up in the short period of a few months to 2 feet above it; thus filling up a space of 12 feet in height. Looking at the vast expense of keeping the harbour clear—and again, at the great inconvenience to the shipping by a reduced depth of water, arising from shoals and banks being so rapidly formed within it, so extremely detrimental to its free navigation—I am impressed with a more full conviction, that the most active and the most energetic steps should be adopted to diminish those evils as far as practicable. Therefore, the clearing away immediately of the weir at the Broomielaw Bridge, the widening of the mouth of the harbour, and the deepening of the river up to Stockwell Bridge, would tend partly to remove the evils here stated, because those operations would increase the tidal currents through the harbour, and equalise them at its mouth.

The matter discharged from the city sewers on the north side into the harbour, might be entirely removed by the construction of a large sewer, commencing near the jail, and running parallel with the river down to below Barclay's Slip, where it would enter the Clyde. This sewer would receive the whole of the drainage which at present falls into the harbour from the city of Glasgow on the north, and would consequently free the port from considerable deposits which are discharged into it.

The peculiar construction of the present harbour of Glasgow, with its narrow entrance, its head barred by a stone weir extending across from side to side, over which the high tide only sometimes rises but a few inches, so that there is scarcely any perceptible tidal current upwards through it during the whole period of flood tide, until the water has reached above the top of the weir at the Broomielaw Bridge; the water sent up by the tide of flood, as well as the river water descending and falling over the weir into the harbour, remains in a quiescent state, except during the times of floods. Thus, the alluvium contained in the descending waters of the river, the silt carried in by the city sewers, and the fine particles of matter held in suspension by the tidal water flowing up—all meet in the harbour of Glasgow—at every tide, forming immense deposits, undisturbed by any tidal current for more than four hours; which fully accounts for the rapid manner in which the harbour of Glasgow silts up, and the great expense which is constantly required to keep it clear and open by steam dredging-vessels. But if that part of the river between the Broomielaw Bridge and Stockwell Bridge were deepened, it would receive the river debris before it could reach the harbour, and it could be dredged up there as cheaply as any where else, and without any inconvenience to the shipping.

What can be compared to a fine navigable river flowing free and unfettered, without lock or dam, through a city, laying open, by its upper reaches, the rich mineral wealth of the interior country to the enterprise and industry of the people; while, on the other hand, the lower reaches of the river waft the ships to the ocean, that highway to all the regions of the world!

It must be manifest to any person who has observed the immense business which is carried on by small craft, on the waters of the Thames at London between the bridges, on the Seine in Paris, and on many other rivers which run through cities and towns, that the clearing away of the weir at the Broomielaw Bridge, and making the river Clyde navigable through the city, would be a work of the greatest public utility, conferring advantages of the most beneficial kind, not only on the shipping interest, but also on the whole population of Glasgow.

The Govan railway delivers at the harbour of Glasgow annually from 60 to 65,000 tons of coal; and although this railway will, in my opinion, continue to increase in its traffic, yet I am confident that the opening of the upper navigation of the Clyde would be the means of sending down by water considerable quantities of coal and other minerals, &c., to the shipping in the harbour; and it may be observed, that the descending tidal and river currents—a power which costs nothing—would offer every facility to the transmission of coal and other articles downwards, which could be shipped at once from the barges or punts into the ships and steamers lying in the harbour, without encumbering and occupying so much of the quays, or wearing the streets by the constant cartage of such vast quantities of coal, which are not only required for exportation, but also for the supply of the numerous steamers on the Clyde, and those plying to the ports of England and Ireland. Coal-lighters, carrying about 100 tons, descend the Mersey, enter the docks of Liverpool, and supply the shipping. The facilities to river navigation which the Clyde offers, from the harbour, to a considerable distance above the city, into the coal and iron districts, are extremely inviting for the carrying on of a similar traffic.

The space, as already mentioned, between the Stockwell and Broomielaw Bridges, contains an area of nearly 14 acres. The deepening and the constructing of wharfs within it, would be less expensive, and would afford comparatively more accommodation to the small shipping craft than any other place which could be found anywhere within the vicinity of the harbour. The expense of the contemplated works will be nearly as follows:—

Masonry, in wharfs and quay-walls, 1350 feet long, .	£17,287	11	6
Deepening channel, paving, cranes, pauls, &c., .	8,047	17	0
Securing Stockwell Bridge, ...	1,234	11	8
Total, . . .	£26,570	0	2

It may be proper to observe, that the deepening between the bridges to two feet below low-water line, will not, in my opinion, disturb the foundations of the existing quay-walls in the harbour.

In concluding, it is to be hoped that the space between the Broomielaw and Stockwell Bridges, which is now waste and useless, without a raft of timber, or even a small boat, to adorn its surface, will very soon be covered with numerous classes of small vessels, presenting a scene of a busy maritime trade nearly in the middle of the city. And now that railways are about to compete with the steam-boat passenger trade, what immense advantages would it confer on the steam navigation of the river, if the weir were removed, thereby enabling the steamers sailing to all the lower parts of the Clyde, to arrive and take their departure from between the bridges, or even from the Broomielaw Bridge, which would be so extremely convenient and central to the inhabitants of the city.

WILLIAM BALD.

Glasgow, 30th Oct. 1840.

INSTITUTION OF CIVIL ENGINEERS.

DESCRIPTION OF A BRIDGE FOR A RAILWAY CROSSING ABOVE A TURNPIKE ROAD, WHERE THE DEPTH BETWEEN THE SOFFIT OF THE BRIDGE AND THE SURFACE OF THE RAILS IS LIMITED TO TWENTY-ONE INCHES. BY JOHN POPE, GRAD. INST. C. E.

THIS bridge was designed by Mr. W. Cubitt, V.P., to meet the conditions of a clause in a railway bill, which required that there should be a clear width of opening for headway through the bridge in every part, 30 feet wide by 20 feet high, whilst at the same time the height of the embankment limited the space between the under side of the bridge and the surface of the rails to 21 inches.

The railway is carried on three cast-iron girders, each 3 feet deep at the centre, diminishing to six inches at each end, with a bearing of 2 feet on cast-iron wall-plates, supported by brick-work abutments. The flanches of the girders are 8 inches wide, and the metal every where 2 inches thick. Balks of Memel timber, 12 inches square, are laid transversely, close jointed, their ends bearing upon the flanches of the girders; on these timbers the chairs are fixed, and the rails are laid. The whole depth employed is:—

The flange of the girder . .	2	inches
Thickness of timber balks . .	12	„
Depth of the rail and chair . .	6¼	„
	20¼	inches

One of the girders on each side supports the parapet wall, in which it is completely encased, and being faced with cut stone, assumes the appearance of a flat camber arch, 3 feet in depth.

A detailed drawing, showing minutely the construction, accompanied this communication.

DESCRIPTION OF THE ARCHED TIMBER VIADUCTS ON THE NEWCASTLE AND NORTH SHIELDS RAILWAY, ERECTED FROM THE DESIGNS OF MESSRS. JOHN AND BENJAMIN GREEN; AND ON THE APPLICATION OF THE SAME SYSTEM OF CONSTRUCTION TO OBLIQUE AND OTHER BRIDGES, TO THE ROOFS OF RAILWAY STATIONS, AND TO OTHER LARGE BUILDINGS. BY BENJAMIN GREEN.

THE construction of viaducts and bridges forms so important an item in the cost of a railway, that the engineer is induced to devise new methods of completing his works with due regard to stability and durability, and at the same time with the least possible expense. Stone and brick have been the materials most generally used for bridges; cast-iron has been introduced where the heights were too low for the spans, in large arches, or in trussed beams where a certain clear space beneath was required, with only a limited height to the level of a rail. Timber, from its lightness, strength, and cheapness, has been extensively used, but only in spans of limited extent, owing to the sole mode of its application being by framed trusses, upon the same principles as those usually employed for roofing.

These considerations induced Mr. John Green, as far back as the year 1827, to make a design and model for a bridge, with timber arches resting upon stone piers. In 1833 the plan was adopted, and in 1837 it was put into execution at the Ouse Burn Viaduct, where the construction was of great extent, and the cost was an important consideration.

The viaduct is 918 feet in length, and 108 feet in height from the bed of the river. There are five arches, the versed sine 33 feet, and the radius 68 feet; three of them are 116 feet span each, and two are 114 feet each: two stone arches of 40 feet span each have been introduced at each end to give length to the abutments, and to prevent the embankments from being brought too near to the steep sides of the ravine. The piers are of stone: the springing stones for the three ribs, of which each arch is composed, are on offsets within 40 feet of the top of the piers; cast-iron sockets are there bedded in the masonry, and secured so as to receive the feet of the ribs. Two of the piers are placed upon piles; the others are founded upon the rock: immediately beneath the centre of one of them an old coal-pit shaft was discovered, and close adjoining it the remains of the working of a coal seam: both were rendered secure by being filled up with grouted rubble masonry.

The ribs for the arches are composed of planks of Dantzic deal (Kyanized); the lengths vary from 46 feet to 20 feet, by 11 inches wide, and 3 inches thick: they are so disposed, as that the first course of the rib is two whole deals in width, the next is one whole and two half deals, crossing the joints longitudinally as well as in the depth. Each rib consists of fourteen deals in thickness, bent over a centre to the required form, and secured together by oak treenails 1½ inch in diameter at intervals of 4 feet apart, each treenail traversing three of the deals. A layer of strong brown paper dipped in boiling tar is placed between the joints, to bed them and exclude the wet. Trussed framings and beams are secured upon the arched ribs; the platform, composed of planks, each 11 inches wide by 3 inches thick, is spiked down and covered with a composition of boiling tar and lime mixed with gravel in laying on, forming a coating impervious to the wet; upon this platform the two lines of railway are laid, leaving a foot-path between them.

The centreing for turning the ribs was very light and simple, and as every convenience was afforded by having a railway with travelling cranes along the sides of the piers, a whole centre could be moved by twenty men from one arch, and fixed in another, in one day.

The author then describes the construction of the Wellington Viaduct, and that which has been erected by him at Dalkeith for the Duke of Buccleuch: giving the relative costs of the three structures which have been mentioned, and stone buildings of the same dimensions: whence it appears that in the Ouse Burn Viaduct there was an economy of £9000 resulting from the adoption of this system.

He then shows the application of this system to the structure of oblique bridges, particularly where a certain clear space is required beneath, and the total height is limited: this is illustrated by a description of a bridge of 71 feet span, on the Newcastle and North Shields Railway, which crosses the turnpike road at Walker, and by one erected over the river Wear on the West Durham Railway.

He describes also the application of the same system to the extensive buildings and sheds of the Shields Railway station; to churches and to private houses; in the latter the arched form is very advantageous in gaining space for the upper rooms, showing at the same time the economy resulting from the adoption.

The paper is illustrated by a series of nine elaborate detailed drawings, showing the application to every kind of construction.

Mr. Rendel remarked, that on those railways where first cost was a matter of importance, the introduction of a superior kind of timber bridge was a great desideratum. The communication proposed the application of tarred paper between the joints: from experience he could not recommend either paper or felt in such situations. He found that both substances prevented the intimate contact of the surfaces of the timber; in all framings exposed to the action of the weather the tar was absorbed by the wood; the paper and felt then became saturated with and retained the moisture, so that decay very speedily ensued. The mode he at present adopted was to have all the joints and mortices of the framing very closely fitted, leaving only sufficient space at the edges to be caulked with oakum, and the joint run with pitch, like the seams of the deck of a vessel. Wherever it was practicable, great advantage would result from covering the joints with sheet lead, to exclude the moisture and prevent the decay, which was the great bar to the more general use of timber in engineering works.

Mr. Vignoles was inclined to think the curve of the arch was too steep: he should prefer its being flatter. He would not then enter into the subject, but he would present to the Institution a large model of a timber bridge, and with it a communication, explaining his views on the subject, which was one to which he had paid much attention.

"The removal of the weir at the Broomielaw Bridge, and the deepening and clearing of the space upwards to Stockwell Bridge, containing nearly 14 acres, would give much additional tidal water; thereby increasing the currents not only through the harbour, but also to some extent in every part of the Clyde downwards; thus aiding and assisting that scouring force which acts so powerfully in freeing and keeping clear all river estuary channels from banks and shoals—the great obstacle to navigation. In the improvement of the navigation of tidal rivers, no expense or pains should be spared to increase this scouring force, arising from that uniform and constant tidal flow and run of currents, ascending and descending alternately, and which are so eminently distinguished by their beneficial effects in preserving navigable channels, as compared with those violent land-floods, which, in many instances, so frequently carry down immense masses of matter, forming shoals, banks, and bars in them, extremely injurious to the navigation, and involving great expense in keeping them clear.

The removal of the weir at the Broomielaw Bridge, and the additional receptacle for tidal water between the bridges, would have a tendency to sweep and scour away all those impurities which are at present discharged into it by the city sewers. The removal of the weir, and the deepening and clearing away of the channel of the river, would also have the effect of lessening the miasma which arises from the present condition of the bed of the Clyde between the bridges, and would render the atmosphere of that part of the city much more pure and healthy.

It is noble and praiseworthy to erect hospitals and asylums for the relief of those who may unfortunately be afflicted with fever; but how much more advantageous would it be to cut off and destroy the sources from which that contagion arises, by the removal of all offensive matter? In this respect, the attention paid by the Dutch to many of their cities and towns, offers an excellent example to the people of other countries.

At present, the harbour of Glasgow is a receptacle, not only for a large portion of the debris which the Clyde sends down during the floods, but it is also a reservoir for almost the whole of the matter discharged by the city sewerage. The quantity delivered into the present harbour from those two sources is immense.

The flood of last August left a deposit on the steps of the upper ferry-stairs, on the south side of the harbour, as follows:—On the upper step, reached by the flood, a depth of 2 inches; on the descending steps, 2½, 2⅔, 2⅔, 3¼, 4¾, and 5 inches. The last step was about 3 feet 4 inches below ordinary high-water line. It has been alleged that the river Clyde leaves little or no deposit; but the above facts prove the fallacy of such a statement. Besides, no experienced observer could have a doubt on this subject, who has seen the extremely discoloured state of the water of the Clyde during a flood, by the quantity of alluvium held in suspension, and which is deposited in the bed and sides of the Clyde, wherever the tranquillity of the water is not disturbed by a current sufficient to carry it away; and it should always be recollected, that, in the improvement of the navigation of a river, and the widening of a harbour through which it runs, a velocity of 3inches per second at bottom will work on fine clay; that 6 inches per second will lift fine sand; 8 inches per second, sand as coarse as lintseed; 12 inches per second will sweep along fine gravel; 24 inches per second, gravel one inch in diameter. These established facts ought to govern the engineer as to the width which should be given to rivers, and to harbours through which rivers flow, so as to regulate the velocity of the water and prevent them from being silted up with alluvial matter, or involve a serious expenditure in keeping them clear by the artificial means of steam-dredging; therefore, no exertion or expense should be spared to increase the natural force of the scouring power, by the descending currents through river harbours and river navigations.

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It may be proper to observe, that the deepening between the bridges to two feet below low-water line, will not, in my opinion, disturb the foundations of the existing quay-walls in the harbour.

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INSTITUTION OF CIVIL ENGINEERS.

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The railway is carried on three cast-iron girders, each 3 feet deep at the centre, diminishing to six inches at each end, with a bearing of 2 feet on cast-iron wall-plates, supported by brick-work abutments. The flanches of the girders are 8 inches wide, and the metal every where 2 inches thick. Balks of Memel timber, 12 inches square, are laid transversely, close jointed, their ends bearing upon the flanches of the girders; on these timbers the chairs are fixed, and the rails are laid. The whole depth employed is:—

The flange of the girder . .	2	inches
Thickness of timber balks . .	12	„
Depth of the rail and chair . .	6½	„
	20½	inches

One of the girders on each side supports the parapet wall, in which it is completely encased, and being faced with cut stone, assumes the appearance of a flat camber arch, 3 feet in depth.

A detailed drawing, showing minutely the construction, accompanied this communication.

DESCRIPTION OF THE ARCHED TIMBER VIADUCTS ON THE NEWCASTLE AND NORTH SHIELDS RAILWAY, ERECTED FROM THE DESIGNS OF MESSRS. JOHN AND BENJAMIN GREEN; AND ON THE APPLICATION OF THE SAME SYSTEM OF CONSTRUCTION TO OBLIQUE AND OTHER BRIDGES, TO THE ROOFS OF RAILWAY STATIONS, AND TO OTHER LARGE BUILDINGS. BY BENJAMIN GREEN.

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The ribs for the arches are composed of planks of Dantzic deal (Kyanized); the lengths vary from 46 feet to 20 feet, by 11 inches wide, and 3 inches thick: they are so disposed, as that the first course of the rib is two whole deals in width, the next is one whole and two half deals, crossing the joints longitudinally as well as in the depth. Each rib consists of fourteen deals in thickness, bent over a centre to the required form, and secured together by oak treenails 1½ inch in diameter at intervals of 4 feet apart, each treenail traversing three of the deals. A layer of strong brown paper dipped in boiling tar is placed between the joints, to bed them and exclude the wet. Trussed framings and beams are secured upon the arched ribs; the platform, composed of planks, each 11 inches wide by 3 inches thick, is spiked down and covered with a composition of boiling tar and lime mixed with gravel in laying on, forming a coating impervious to the wet; upon this platform the two lines of railway are laid, leaving a foot-path between them.

The centreing for turning the ribs was very light and simple, and as every convenience was afforded by having a railway with travelling cranes along the sides of the piers, a whole centre could be moved by twenty men from one arch, and fixed in another, in one day.

The author then describes the construction of the Wellington Viaduct, and that which has been erected by him at Dalkeith for the Duke of Buccleuch: giving the relative costs of the three structures which have been mentioned, and stone buildings of the same dimensions: whence it appears that in the Ouse Burn Viaduct there was an economy of £9000 resulting from the adoption of this system.

He then shows the application of this system to the structure of oblique bridges, particularly where a certain clear space is required beneath, and the total height is limited: this is illustrated by a description of a bridge of 71 feet span, on the Newcastle and North Shields Railway, which crosses the turnpike road at Walker, and by one erected over the river Wear on the West Durham Railway.

He describes also the application of the same system to the extensive buildings and sheds of the Shields Railway station; to churches and to private houses; in the latter the arched form is very advantageous in gaining space for the upper rooms, showing at the same time the economy resulting from the adoption.

The paper is illustrated by a series of nine elaborate detailed drawings, showing the application to every kind of construction.

Mr. Rendel remarked, that on those railways where first cost was a matter of importance, the introduction of a superior kind of timber bridge was a great desideratum. The communication proposed the application of tarred paper between the joints: from experience he could not recommend either paper or felt in such situations. He found that both substances prevented the intimate contact of the surfaces of the timber; in all framings exposed to the action of the weather the tar was absorbed by the wood; the paper and felt then became saturated with and retained the moisture, so that decay very speedily ensued. The mode he at present adopted was to have all the joints and mortices of the framing very closely fitted, leaving only sufficient space at the edges to be caulked with oakum, and the joint run with pitch, like the seams of the deck of a vessel. Wherever it was practicable, great advantage would result from covering the joints with sheet lead, to exclude the moisture and prevent the decay, which was the great bar to the more general use of timber in engineering works.

Mr. Vignoles was inclined to think the curve of the arch was too steep: he should prefer its being flatter. He would not then enter into the subject, but he would present to the Institution a large model of a timber bridge, and with it a communication, explaining his views on the subject, which was one to which he had paid much attention.

Mr. Macneil had found constant trouble to result from the decay of wooden bridges. The Dalmarnoch bridge, which had been erected about thirty years, now demanded continual repairs; the struts were nearly all decayed at the points of insertion into the cast-iron sockets. The original floor had been replaced by one of teak wood.

In answer to a question from the President as to the process of "Kyanizing" timber for the Hull and Selby railway, Mr. Timperley described the method pursued there. In a close cylindrical wrought-iron vessel, 70 feet long and 6 feet diameter, filled with a solution of corrosive sublimate, the timber was piled, leaving a space along each piece; the air was then exhausted by air-pumps to a vacuum of about 25 inches by the mercury gauge, and by the application of a force-pump, under a pressure of 100lbs. per square inch, the solution was driven into the pores of the timber. From experiments he had made he believed that the timber was thus thoroughly saturated, and although sufficient time had not elapsed to give any correct result as to the comparative duration of the sleepers, he thought very favourably of the process.

The original cost of the timber, which was the best Riga balk, squared, was £5 10*s.* per load (50 cubic feet). The expense of "Kyanizing" about 400,000 cubic feet, including the interest of the first cost of the apparatus, was between fourpence and fivepence per cubic foot. The process was carried on with greater rapidity, and much more effectually, than it could have been done in open tanks.

Mr. Lowe was of opinion, that although the mechanical part of this process appeared very effective, it was not really so. There were chemical difficulties: a certain length of time was required to dilute and extract the sap and aqueous matter from the pores. The greater or less duration of the process might in some measure account for the difference of the results practically obtained. Dry planks succeeded better than wet ones; with sound dry timber any solution of the metallic salts, such as the sulphates of iron or copper, was efficacious, but with wet timber he doubted whether any preparation would be effectual.

Mr. Cooper believed that in the process of "Kyanizing" the chlorine united with the albumen, and formed chloride of albumen; it was possible that in the exhausting process the air contained in the timber would expand, and prevent the capillary tubes from becoming perfectly saturated with the solution of corrosive sublimate.

AGRICULTURE OF CHESHIRE.

[Though the following document appeared three years ago, it was sent to us only very lately; and we apprehend that it still gives but too true a picture of the state of cultivation, not only in Cheshire, but in many other of the agricultural counties of England. As increased and improved produce of the land is the subject to which talent ought first and chiefly to be directed, we shall be happy to receive brief documents descriptive of the state of other districts; because these will enable such of our readers as take an interest in this most important subject to understand the local obstacles which stand in the way of Agricultural Engineering; and until these, whether in landlord or tenant, or in the relation between them, are removed, the progress of improvement will be slow. The rapid increase of population in many of the continental states, renders this of paramount importance; and if it is not attended to, and that speedily, our country will become comparatively worse and worse every day.—Ed.]

1. Is the agriculture better or worse than that of other counties, such as Yorkshire or the Eastern counties?—Much worse; owing partly to the tenants being more ignorant, and more, as it were, (from want of leases) in a state of vassalage, and partly owing to the landed proprietors not wishing to have Gentlemen Farmers on their estates (many of them persisting in the *worse* than antiquated notion that their religious creed *must* be the *true* test of their agricultural knowledge), and partly to most of the persons having the charge of landed property in this county, being incompetent to judge what sort of management is best for the ultimate and permanent benefit of the estates. Schools where a liberal education, including *physical* and *moral*, as well as *intellectual*, for the agricultural population are much wanted, and until these are supplied, the agriculturists never will be what they ought to be in point of intelligence.

2. What is the usual management of heavy soils fit for wheat and beans?—Summer fallow from ley, wheat second year without any manure, oats third year, summer fallow the fourth year, wheat fifth year, oats with grass and clover seeds sixth year, hay seventh year, afterwards pasture until the ground has so long rested as to be considered able to bear another *such* rotation!

3. What for turnip land?—Similar to No. 2, except substituting potatoes or turnips, or some such fallow crop, for a naked fallow.

4. How often do naked fallows recur?—Answered in No. 2.

5. How many times are they ploughed?—Sometimes four, five, or six times, according to circumstances; but, generally speaking, the two last ploughings are so late in the season, say the end of August or September, that they are of little effect in either cleansing or mellowing the ground.

6. Is the long fallow for barley, including two winters, ever introduced?—Never practised in this county.

7. What kinds of ploughs are generally used?—Generally the common Cheshire plough, but many of the better farmers are now adopting the Scotch iron swing plough.

8. How many horses to each?—Often three to four in a trip, *i. e.*, one before the other; but such farmers as have adopted the Scotch swing plough, now plough with two horses abreast.

9. Are oxen much used for the plough?—Never.

10. How are they yoked?—Answered by No. 9.

11. Do they harrow the land very fine before and after sowing?—Generally speaking, moderately fine, but not too much so.

12. Is the drill husbandry in use for green crops—are they horse-hoed?—Amongst the better farmers, such as have adopted the iron plough, the drill husbandry for green crops is beginning to be practised on a small scale.

13. What is the average quantity of wheat per acre sown, and what reaped on land of moderate fertility?—About two bushels (of 70lbs to the bushel) sown on a statute acre, and amongst the ordinary class of farmers about eighteen or twenty bushels such weight of produce is considered a good crop! Amongst the best farmers (owing to superior management) thirty-five or forty bushels is considered to be only a fair average crop.

14. What is the rent (rates and tithes included) of such land?—These vary from 30*s.* to 45*s.* per statute acre, according to circumstances, and the distance from a town, the facility of getting manure, &c. The tithe everywhere is hated, and is a great drawback to improvements in agriculture.

15. Is much clover sown, or other artificial grasses?—Much more than formerly, but still amongst most farmers the practice of sowing *hay-seeds*, full of all sorts of *bad seeds*, is but too prevalent.

16. When grass land is broken up, is it usually fallowed the second year?—Usually fallowed the first year, except by good farmers (who are but few in number) who lay their land down to grass in good heart, *i. e.*, full of manure. They have generally oats the first year of breaking up, and green crop in drill the second year, the third year wheat sown with perennial rye-grass and clover-seeds, in the fourth year hay, fifth year pasture, &c.

17. When land is laid down, is it clean and in good heart?—This is answered in No. 2; such a system as is there stated, land cannot be laid down in good heart—it must be what the farmers call "*in landlord's condition.*"

18. How many white crops succeed each other on newly broken up grass land?—This is answered in No. 2.

19. Are beans generally cultivated?—Very few are cultivated.

20. Are they drilled or dibbled, and at what distance?—Generally dibbled what are sown.

21. How many times horse-hoed or hand-hoed?—Perhaps once hand-hoed, but often never touched after being sown.

22. Are turnips raised in rows or broad-cast?—Generally speaking broadcast by the common farmers, but the best farmers now sow them in rows of about 27 to 30 inches apart.

23. Are they fed off by sheep, or drawn for the cattle?—Almost never fed off by sheep, generally drawn for cattle.

24. Are there any late improvements in the dairy, or breed of cows?—The breed of cows is much improved within these last ten years; the short-horn Durham, or a cross of the short-horn, is now preferred almost everywhere in the county.

25. What is the average produce of a cow in butter or cheese?—About 360 lbs. of cheese, or about 180 lbs. of butter.

26. What is the rent of good grass land?—This varies from 35*s.* to 100*s.* per statute acre.

27. Are many sheep kept, and what breed?—Very few sheep are kept, and what are kept are generally Cheviot, or a cross between the Cheviot and Leicester, or South Down.

28. Is there a spirit of improvement in any but the gentleman of property?—The spirit of improvement seems to be nearly as slow amongst *most* gentlemen of landed property, as amongst the tenantry of the county;

perhaps partly owing to the want of funds, but more, I should imagine, from the want of *respectable* and experienced men, in whom they can place unlimited confidence, to manage the whole detail of the various departments of their landed estates. It cannot be expected that improvements should be judiciously made by men who (whatever their talents in their own profession may be) are practising as lawyers, or by men taken from some menial office, such as an *old groom*, a butler, or gardener, and placed at the head of all the departments. It might as well be expected that the whole of a large and complicated building is to be properly and economically built by a common brick-setter or stone-mason, or that any piece of complicated machinery is to be constructed and worked by any common blacksmith, who might be able with *much* labour to make one or more of the simplest wheels, as that the management and improvement of an extensive landed estate is to be conducted by any others than men educated for the business, and *capable of seeing at one glance* whether the whole of the complicated machinery is working well or not. Merchants and manufacturers, who are men of business themselves, always take care to have *proper* persons to conduct *their business*, however high the remuneration may be for their services. I may add, that were two or three hundred *respectable* estate agents who have been *liberally* educated, and in every way *properly trained to the profession*, placed on two or three hundred of the *best estates* in England, *they would do ten times more* for the improvement of agriculture, during these next ten years, than all the agricultural societies that now are or may be established in the kingdom, or the united wisdom of both houses of parliament could accomplish for these next *fifty* years. If *such persons* were to be appointed the *responsible managers of* all *lands* belonging to the crown, I should think that their present revenue would be at least quadrupled in less than twenty years; and if such gentlemen were to be appointed by the government, or by the Lord Chancellor, *inspectors* over all the landed estates under the control of the Court of Chancery, and report annually to his lordship, as to the condition of the lands, and necessary repair of the buildings, &c., they would be the means of preventing much serious waste on such estates, and consequent loss and misery to many of those who afterwards may possess them.

Every Estate Agent OUGHT TO *be capable of acting as a Tutor to the Tenantry*, and, *in all business matters*, as an able and confidential Counsellor to the Landlord.

A. O.

MISCELLANEOUS.

STEAM CARRIAGE.—A steam coach, or more properly speaking, a steam carriage, on an improved principle, and carrying sixteen persons, belonging to the General Steam Company, was on Saturday, the 7th August, tried on the road between the north eastern point of the Regent's Park, and the Manor House at Tottenham. The carriage, which is an experimental one, has four transverse seats, each of which accommodates four persons; the boiler and apparatus are behind the seats; the conductor, or he who has the management of the carriage, sits on the front seat, and guides it and governs its speed by a sort of handle, which rises from the footboard. The carriage left the York and Albany Tavern a little after four o'clock, and proceeded with a full load of scientific gentlemen to the Manor House, Tottenham; here it was turned round with perfect facility, by the conductor, and it returned to the York and Albany Tavern. The distance traversed is between eight and nine miles, and was performed in rather less than half an hour. The road undulates considerably, and there are some steep ascents; nevertheless, the speed up hill was good, certainly twelve miles an hour; on level ground it was fourteen; and on the descents sixteen or eighteen miles. The carriage was turned round when going at the rate of ten miles an hour. The conductor had a perfect command of the carriage, and caused it to pass between carriages drawn by horses, carts, &c., with which some portions of the road were crowded, without coming in contact with any of them, and with a facility of management that was surprising. The appearance of the carriage, and the rapidity of its motion, caused several horses to shy, but no accident ensued. There is no visible escape of steam, nor is there any annoyance of smoke. The trip was very satisfactory.

OPENING OF THE LONDON AND BRIGHTON RAILWAY.—This railway was opened throughout to the public on Tuesday September 21st. The first train left Brighton at a quarter before 7 o'clock, and was followed at the hours advertised by the other trains, all which made their journeys with great punctuality. The first London train departed from the London bridge station at a quarter to 10, with thirteen carriages, three of which were appropriated to the use of the directors and their friends, the rest being filled with passengers, and reached the Brighton station precisely at a quarter past 12, the time specified for its arrival. A vast number of the inhabitants of Brighton lined the railroad between that place and Preston, and, at the Brighton terminus, upwards of 5,000 of the principal visiters and inhabitants had assembled to greet the arrival of the first train. The band of the Scots Greys, the Musard band, and the town band, were in attendance, and played "God save the Queen," which was afterwards sung in verse and chorus by the local singers. Several other airs were also played for the next half-hour, when the next train arrived, and the company then separated. All the stations on the line were decorated with flags.

THAMES EMBANKMENT.—On Monday the 13th, Mr. Walker, the engineer, accompanied by Captain Bullock, R.N., and the harbour-masters and other officers of the Navigation Committee, surveyed the banks of the river above Vauxhall-bridge, and laid down a line of embankment for the improvement of the navigation. On Tuesday, Mr. Walker was attended by Mr. Cubitt, the builder, and by Mr. Simpson, the engineer of the Chelsea Water-works, when a plan was agreed to be recommended, embracing a spacious promenade in front of the extensive range of squares and crescents now in the progress of erection by Mr. Cubitt. The line is intended to follow the course of the river, so as to fall into the mall at Chelsea, and will constitute one of the greatest of the modern improvements of the metropolis. The Navigation Committee, while they protect the river from encroachments, are determined to prevent the walks upon the banks from being enclosed. The private interests of wharfingers and others, who have appropriated to themselves the exclusive use of the banks of the river in the more populous parts of the metropolis, interpose a great impediment, and effectually shut out the public from the advantages of an open and healthful promenade, such as is enjoyed by the inhabitants of every other capital in Europe.

RAILWAY TRAFFIC.—The following calculation of a late weekly return of 31 railways, 1,155 miles in length, will, we believe, be of interest:—Number of passengers on 21 railways, 279,887½, consequently, the total for the week must be above 400,000. The receipts for passengers on 31 railways, £75,046 8*s.* 8*d.*; ditto, for goods on 23 railways, £16,579 19*s.* 5*d.*; total, £91,626 8*s.* 1*d.* This is an average of £79½ per mile per week. The traffic, therefore, is certainly at the rate of more than three millions a year, and carrying fifteen millions of passengers.

METROPOLITAN PATENT WOOD PAVEMENT.—On Tuesday the 14th, the wood pavement in front of Whitehall was taken up by the above Company, in consequence of the Gas Company being obliged to relay their pipes. The pieces of wood, which are fastened together by small dowels, were taken up in masses of about one yard in length, and half a yard in width, and a fair opportunity was thus afforded for estimating the probable success of the experiment. No visible wear and tear was apparent, on a minute inspection of the blocks, beyond that of a slight compression of the fibres on the surface, to the extent of about the eighth of an inch. The upper surface was perfectly even, and the under surface free from all appearance of decay, and the concrete in capital preservation. Considering the vast amount of traffic to which the road is subject, the perfect state of preservation in which the road is at present may be taken as a fair average test of its great superiority and advantage over macadamized roads, and the other plans of wood pavement. During the whole of the time the pavement has been down, it has required, we understand, not the slightest repair. We have no doubt that this plan of wood paving will soon be extended all over the metropolis.

SMITH'S WIRE ROPE.—We are glad to learn that this rope has at length been extended over the whole of the line on the Blackwall Railway, and is found to answer its object exceedingly well. The Directors first tried half a mile of it, and finding it succeed, they added another half mile, and then another, until the whole length is in wire rope. We do not hesitate to say, that the success has been more than we anticipated. We had no doubt that wire rope would do very well for the standing rigging of vessels, and in cases where there was not much coiling or twisting about, but we did not expect that it would ever stand, as it now appears it has, constant coiling and uncoiling over the drums at the stations. We have heard that, after considerable wear, when a part of the rope was untwisted to see what effect the action of the drum had produced, not the slightest effect could be perceived, but that the wire strands were as sound and as good as at first. We had also some apprehensions of the effect of the strong clippers of the carriages, and expected that they would either wrench the wire off, or that the rope would slide through them. Here we have been again pleasingly disappointed. The clippers have been made to take the rope for many times in succession on precisely the same place, without any injury to it, the rope having been previously what is technically called served. The respective strength of wire and hemp rope was tested on Wednesday the 21st ult. The wire rope measured 3¾ inches, and had been at work on the Blackwall Railway

nearly two months, and running the whole length of the line; it broke with 16 tons, and stretched 12 inches. The hemp rope measured 7 inches 5-8ths, and had been at work nearly three months, but only run 4ths of the length of the line, and broke at about 4 or 5 tons.—*Railway Mag.*

LIST OF PATENTS,

Continued from page 192.

(SIX MONTHS FOR ENROLMENT.)

Richard Whittaker, of Cambridge, machinist, for "improvements in cutting the edges of books and paper for other purposes, and in impressing ornaments, letters, and figures on the binding of books and on other surfaces."—Sealed September 4.

Theophile Anton Willhelme, Count of Hompesch, of Mivart's Hotel, Brook Street, for "improvements in obtaining oils and other products from bituminous matters, and in purifying and rectifying oils obtained from such matters."—Sealed September 4.

John Boot, of Quarndron, Leicester, lace glove manufacturer, and John King, of Henor, lace maker, for "certain improvements in machinery or apparatus for manufacturing or producing figured or ornamented fabrics in warp and bobbin net lace machines."—Sealed September 4.

John Grafton, of Cambridge, civil engineer, for "an improved method of manufacturing gas."—Sealed September 4.

Michael Coupland, of Pond Yard, Southwark, millwright and engineer, for "improvements in furnaces."—Sealed September 4.

George Wildes, of Coleman Street, merchant, for "improvements in the manufacture of white lead," being a communication.—Sealed September 4.

William Hill Darker, senior, and William Hill Darker, junior, both of Lambeth, engineers, and William Wood, of Wilton, carpet manufacturer, for "certain improvements in looms for weaving."—Sealed September 4.

Louis Lachenal, of Litchfield Street, Soho, mechanic, and Antoine Vieyres, of 40, Pall Mall, watch maker, for "improvements in machinery for cutting cork."—Sealed September 6.

John Juckes, of Lewisham, gent., for "improvements in furnaces or fire-places."—Sealed September 4.

Pierre Pelletan, of St. Paul's Churchyard, professor of medicine, for "improvements in propelling fluids and vessels."—Sealed September 6.

Joseph Drew, the younger, of St. Peter's Port, for "an improved method of rolling and cutting lozenges, and also of cutting gun wads, wafers, and all other similar substances, by means of a certain machine designed by him, and constructed by divers metals and woods."—Sealed September 6.

Luke Herbert, of 12, Staples Inn, London, for "certain improvements in the apparatus and materials used in the manufacture of gas for illumination, in the apparatus for burning the same."—Sealed September 8.

Richard Else, of Gray's Inn, esq., for "certain improvements in machinery or apparatus for forcing and raising water and other fluids."—Sealed September 8.

William Fairbairn, of Millwall, Poplar, engineer, for "certain improvements in the construction and arrangement of steam-engines."—Sealed September 8.

Joseph Cooke Grant, of Stamford, Lincoln, ironmonger and agricultural implement maker, for "improvements in horse rakes and hoes."—Sealed September 8.

Nathaniel Card, of Manchester, candlewick maker, for "certain improvements in the manufacture of wicks for candles, lamps, or other similar purposes, and in the apparatus connected therewith."—Sealed September 8.

James Thorburn, of Manchester, machinist, for "certain improvements in machinery for producing knitted fabrics."—Sealed September 8.

Miles Berry, of Chancery Lane, civil engineer, for "an improved method, or means of, and apparatus for cleansing typographical characters or forms of type after being used in printing," being a communication.—Sealed September 8.

Oglethorpe Wakelin Barratt, of Birmingham, metal gilder, for "certain improvements in the precipitation or deposition of metals."—Sealed September 8.

Joseph Garnett, of Haslingden, dyer, and John Mason, of Rochdale, machine maker, for certain improvements in machinery or apparatus employed in the manufacture of yarns and cloth, and are also in possession of certain improvements inapplicable to the same," being partly a communication. Sealed September 8.

Edward Loos de Schelestadt, engineer and chemist, and Etienne Sterlingue, tanner, of Regent's Square, in the County of Middlesex, for "certain or new improved machinery or apparatus and process for tanning skins or hides, and preparing or operating upon vegetable and other substances."—Sealed September 8.

George Mannering, of Dover, plumber, and Henry Harrison, of Ashford, plumber, for "certain improvements in the means of raising water and other liquids."—Sealed September 8.

Alphonse René le Mire de Normanday, of Red Cross Square, Cripplegate, doctor of medicine, for "certain improvements in the manufacture of soap."—Sealed September 8.

William Crosskill, of Beverley, iron founder and engineer, for "improvements in machinery for rolling and cutting land, and in machinery to be used for the culture of grass land."—Sealed September 8.

William Hickling Burnett, of Ravensbourne Wood Mills, Deptford Creek, gent., for "improvements in machinery for cutting wood, and in apparatus connected therewith, part of which may be applied to other purposes."—Sealed September 9.

Charles Louis Stanislaus Baron Heurteloup, of Albany Street, Regent's Park, for "an improved manufacture of continuous priming—for an improved mechanism for the application of the same to certain descriptions of fire-arms."—Sealed September 9.

Conrad Frederick Stollmeyer, of Golden Terrace, Barnsbury Road, Islington, merchant, for "certain improvements in obtaining and applying motive power by means of winds and waves, for propelling vessels and water, and driving other machinery."—Sealed September 17.

George Shillibeer, of Melton Street, Euston Square, carriage builder, for "improvements in the construction of hearses, mourning and other carriages."—Sealed September 20.

Francois Marie Agathe Dez Manrel, of Newington Terrace, Surrey, for "an improved buckle," being a communication.—Sealed September 20.

William Charlton Forster, of Bartholomew Close, gent., for "a material or compound of material not hitherto so used, for preventing damp rising in walls, and for freeing walls from damp, which material can be applied to other purposes."—Sealed September 20.

William Newton, of Chancery Lane, civil engineer, for "improved machinery for manufacturing felts and felted cloths," being a communication.—Sealed September 20.

Joseph Hulme, of Manchester, engineer, for "certain improvements in machinery or apparatus for grinding, sharpening, or setting the teeth or cards, or other similar apparatus employed for carding or operating upon cotton, wool, or other fibrous substances."—Sealed Septemper 20.

Thomas Huckvale, of Over Norton, Oxford, farmer, for "improvements in horse hoes, and in apparatus for treating and dressing turnips, to preserve them from insects, and promote their growth."—Sealed September 20.

Alfred Elam, of Huddersfield, in the county of York, surgical instrument maker, for "improvements in apparatus or instruments for the relief and cure of procedemia and prolapsus uteri."—Sealed September 20.

Luke Hebert, of Birmingham, for "improvements in machinery for fulling woollen cloth," being a communication.—Sealed September 20.

William Bush, of Deptford, engineer, for "improvements in the means of, and in the apparatus for, building and working under water."—Sealed September 21.

Comte Melano de Calcina, of Nassau Street, for "improvements in paving or covering roads, and other ways or surfaces."—Sealed September 21.

Edward Emanuel Perkins, of Weston Hill, Norwood, gent., for improvements in the manufacture of soap."—Sealed September 21.

John Duncan, of Great George Street, Westminster, gent., for "improvements in machinery for driving piles."—Sealed September 21.

George Scott, of Louth, miller, for "certain improvements in flour-mills."—Sealed September 23.

James Whitelaw, engineer, of Glasgow, and James Stirral, manufacturer, of Paisley, for "improvements in rotary machines to be worked by water."—Sealed September 23.

Henry Bessemer, of Baxter House, Saint Pancras, engineer, and Charles Louis Schonberg, of Sidmouth Place, Gray's Inn Lane Road, artist, for "improvements in the manufacture of certain glass."—Sealed September 23.